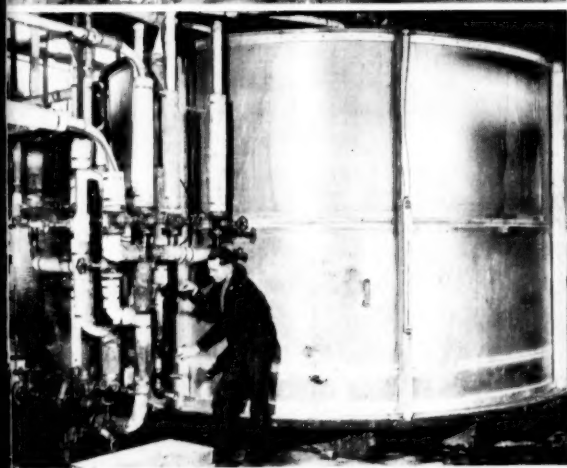
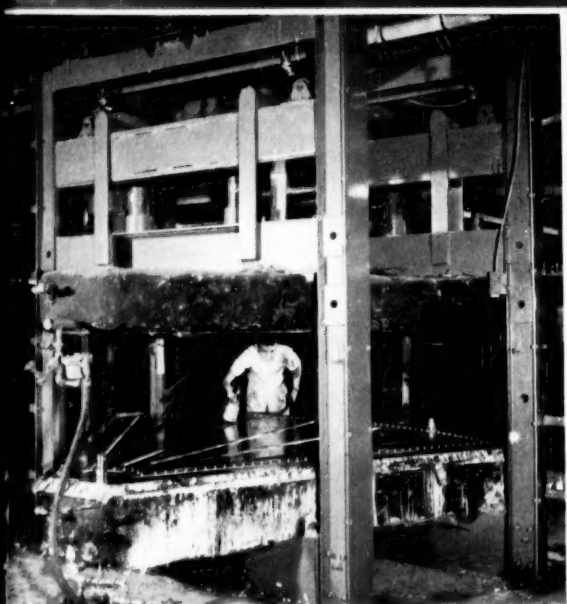


Chemical Week

July 17, 1964

Price 35 cents



There's profit to be made in foreign plants; FOA shows chemical firms where and how . . . p. 18

► Spend more to save more, say makers of new, reinforced epoxy storage tanks p. 40

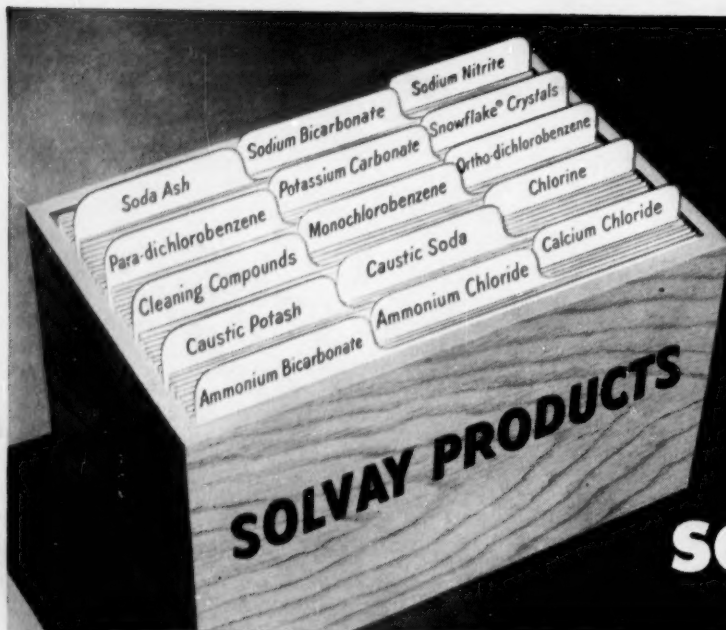
Specialty makers fret about lack of capital, but charge ahead with expansion plans p. 54

Watch for new uses as big firms turn big guns on isocyanate research p. 66

► Fatty acids progress brightens fats and oils gloom; uniformity is the sales key p. 85

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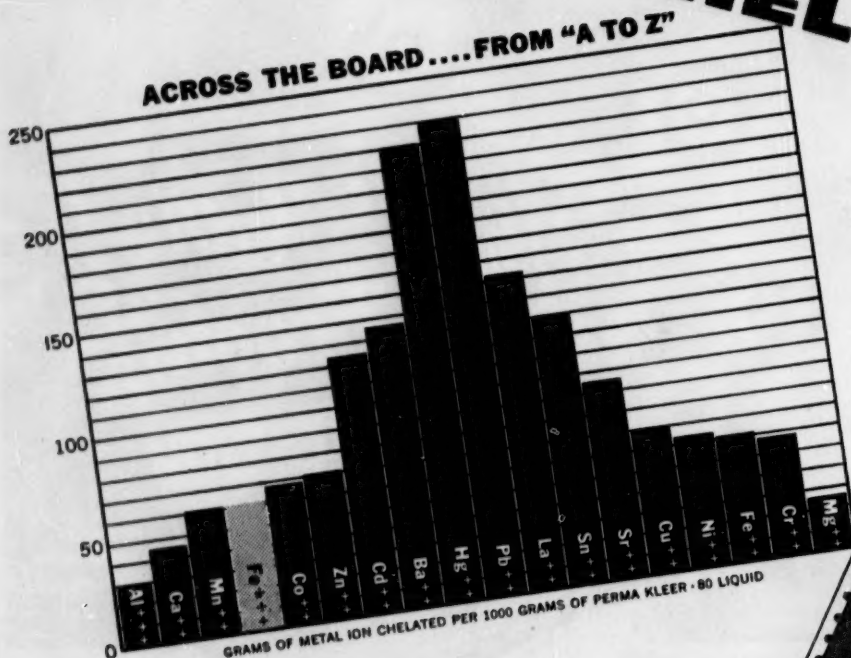
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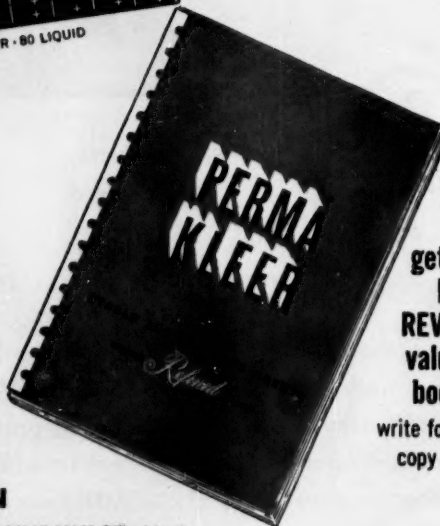
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Chemical Week—

Volume 75

July 17, 1954

Number 3

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July 17, 1954 • Chemical Week

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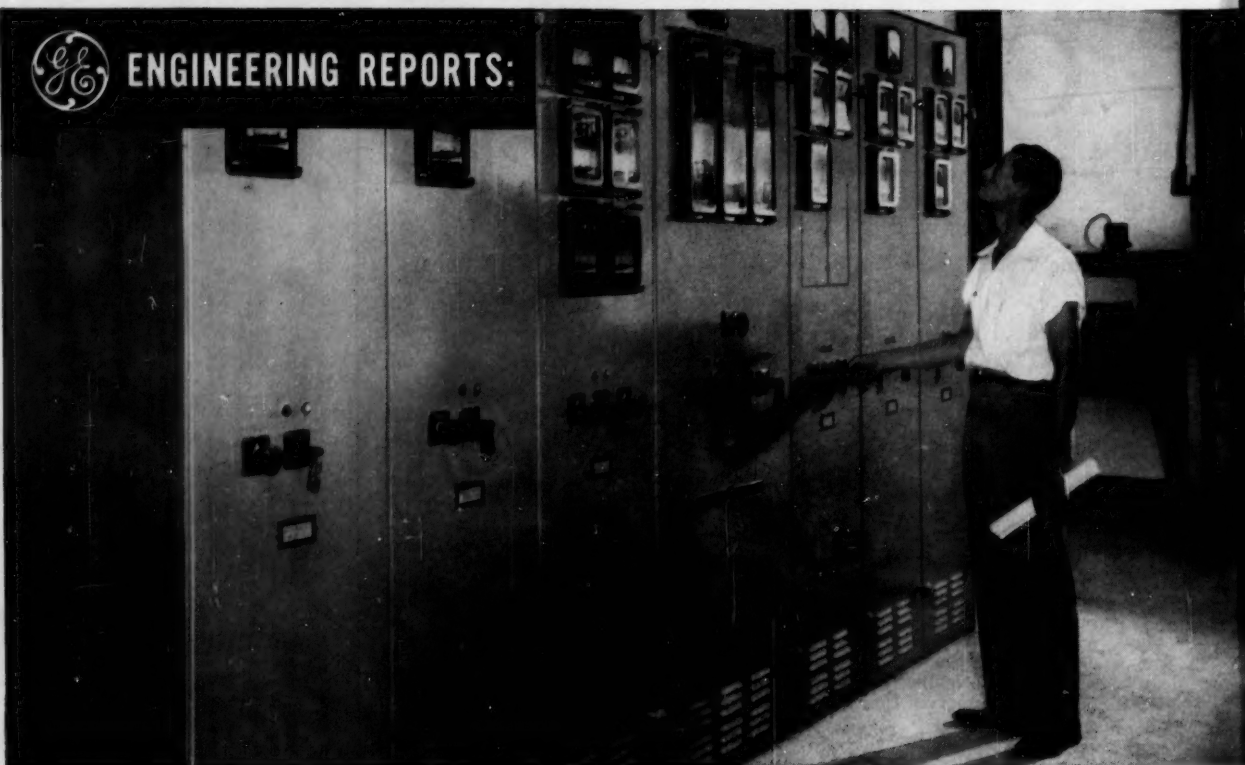
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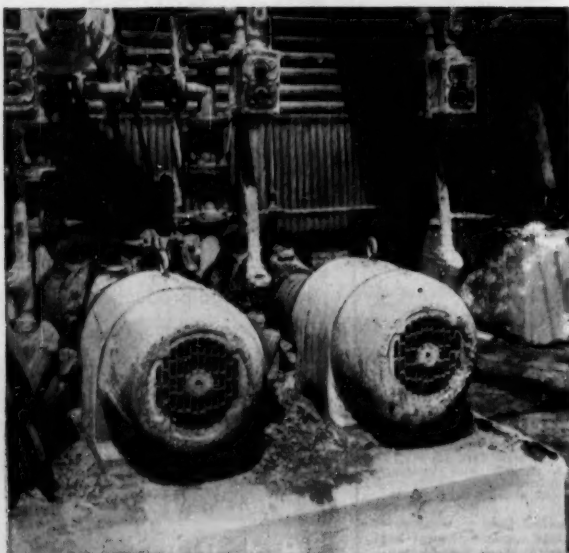
ENGINEERING REPORTS:



ADVICE: Replace switches and fuses with compact G-E switchgear designed with adequate interrupting capacity. Place the equipment in ventilated room to combat corrosion.

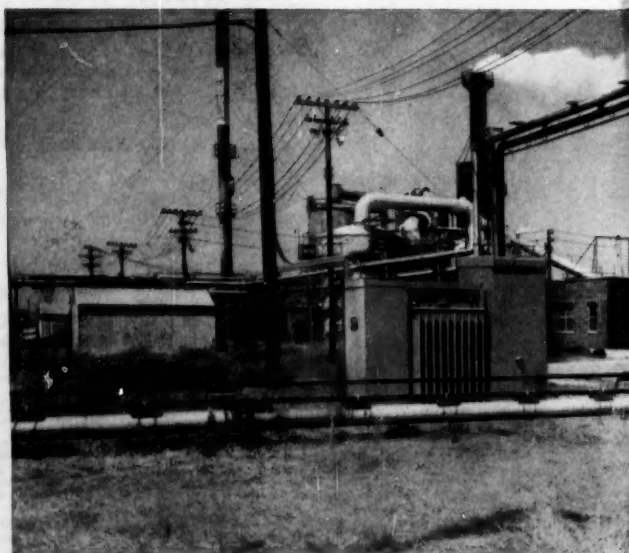
RESULT: Reliable primary power service from main substation. Corrosion problems minimized. Pre-assembly of this metal-clad switchgear at factory cut installation time.

G.E. helps convert wartime plant

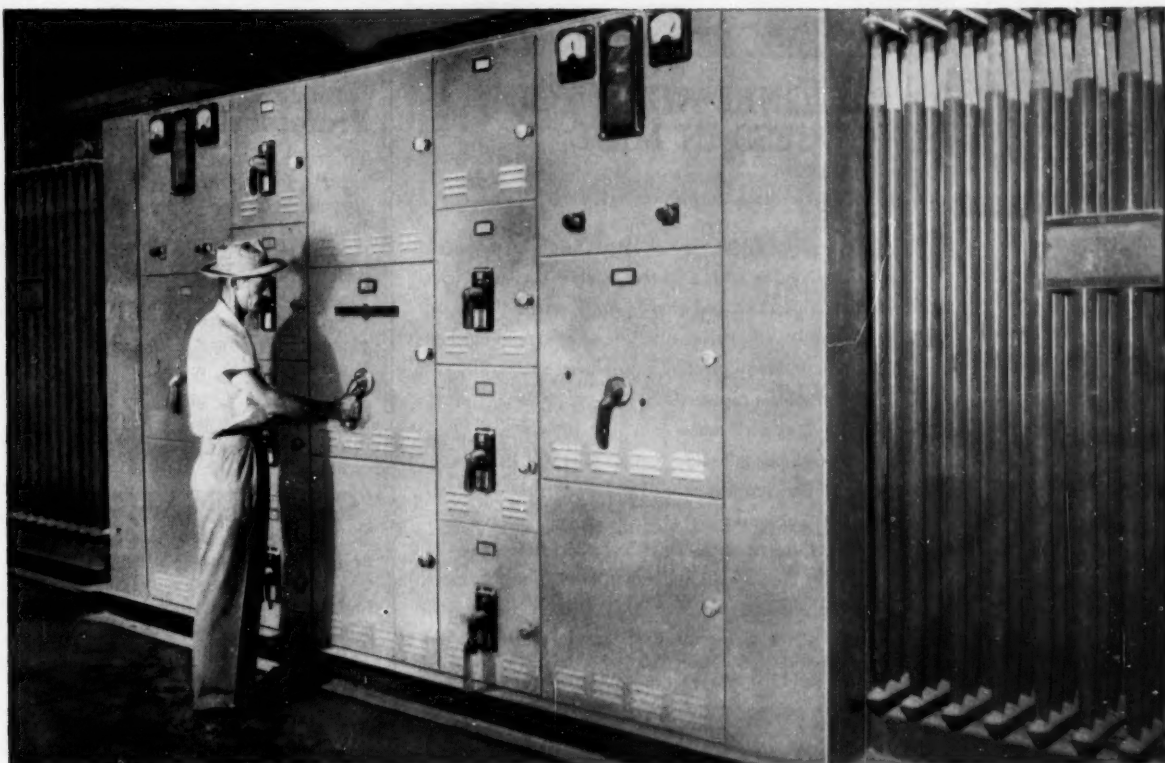


ADVICE: Replace open motors in corrosive areas with G-E totally enclosed, fan-cooled, corrosive resistant Tri-Clad* motors. **RESULT:** G-E motors, such as these driving recirculating pumps, last longer, require less maintenance.

Reg. Trade-mark of General Electric Company.



ADVICE: Place this 500-kva load-center substation near work load which is remote and in less corrosive atmosphere. **RESULT:** Reliable power supply, fewer power lines from primary station, selective fault isolation of secondary circuits.



ADVICE: Replace open pole lines for primary distribution with armored cable. Install G-E double-ended load-center unit substation in ventilated room in center of load area.

RESULT: Fewer and better protected primary lines. Selective tripping of load-center circuit breakers limits secondary power outages to faulty lines. Additional units may be added in the future.

into efficient fertilizer producer

Step-by-step installation of G-E electrical system keeps production smooth at ex-superphosphate plant

A large chemical company operates a superphosphate plant built during World War II, which has been converted to the manufacture of a high-grade fertilizer. The plant's electrical equipment needed to be replaced—and without interrupting production.

General Electric engineers—called in on the problem—made an extensive plant survey and recommended a step-by-step electrical modernization program. The program as adopted combined latest techniques and modern equipment to effectively combat the extreme corrosion caused by sulphuric acid, phosphoric dust, and other chemicals.

In succession, a compact G-E primary substation was installed in a ventilated room—

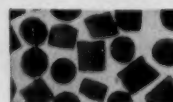
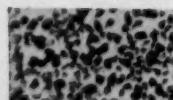
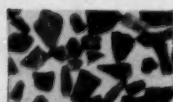
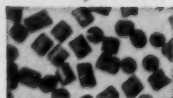
vulnerable power lines were replaced with G-E armored cable—G-E unit substations were located near load centers to cut power losses—and open motors were replaced by G-E totally enclosed motors designed for chemical service. Result: the company reports complete satisfaction with the system.

Whether you plan to build, expand, or modernize a chemical plant, you too can profit by the services of G-E specialists in application and field engineering. These and other specialized engineering services are available to you through your local G-E Apparatus Sales representative. Call him early in your planning stage. General Electric Company, Schenectady 5, N. Y.

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OPINION....**Professorial Support**

TO THE EDITORS: In your reply to the letter by Mr. Rosen (June 26) you agreed with his criticism that data should be used with a plural verb...

Why try "are"? ... "Data is" is accepted today. As reference I cite H. J. Tichy of Hunter College ... see the February 1954 issue of *Chemical Engineering Progress* ... "Engineers can Write Better" ...

A. A. ALBERTS
The Western Co.
Midland, Texas

"O. M. N. E. M. I. I."

TO THE EDITOR: It seems as if sooner or later every one of the readers of CW gets itchy fingers and has to reach for pen or typewriter keyboard and send a letter to the editor.

Well, here's mine.

It's not a criticism nor a laud of you, your magazine, or any of its articles past, present, or future. Like probably most of your readers, I agree with some of the things I read in CW and disagree with others; feel that you did a swell job on this and a not so swell one on that. That, to my way of thinking, does not call for this letter to you.

What I am worked up about at this moment is Mr. Rosen's letter (June 26) ... who dislikes the fact that you made use of the expression, "Data is easy to gather ...".

It is not too long ago that I heard a young colleague use this phrase ... (He received some of his education at Harvard Business School, and had even absorbed a little Latin in school.) I certainly felt that he should know better ... Thus, I asked him about it. What I was told—and what I found confirmed through subsequent observation—was this: Certainly, the plural of datum is data, and since data hence is a plural, one should really use the plural and say: Data are ... If and when, however, data refer to, e.g., figures connected with chemical processes, or with such information expressed in figures ... it has become accepted custom—though not yet printed in Webster's—to use the plural 'data' as a singular (sort of replacing

CW welcomes expressions of opinion from readers. The only requirements: that they be pertinent, as brief as possible.

Address all correspondence to:
W. A. Jordan, Chemical Week, 330
W. 42nd St., New York 36, N. Y.

the word information) . . . Ever since I was given this lecture, I have put my tongue in my cheek when I heard somebody say, or saw somebody write, "Data is easy to gather." . . .

I have been exposed to six years of Latin in high school, and I spent one year on work for a doctor thesis in history of natural science where I had to read countless books and pamphlets written in Latin (that of the learned European layman of the sixteenth century), and I can assure you that Latin is dear to my heart. I certainly dislike thoroughly to see it "messed up" . . . But then, that seems to be the trend, and as long as there are so many other Latin words, singular and/or plural, that are constantly and admittedly, but approvedly, being messed up, why not face the facts and join the crowd in saying 'data is easy to gather.' . . .

Another one of my pet gripes against the loose handling of Latin centers on 'apparatus.' The official and only correct Latin plural is "apparatus." Here, however, even Webster's has broken down and quotes as plural not only the correct one but also the incorrect one: apparatuses. The latter is used more often than not, and I thoroughly dislike to hear, see, or read it. But then, you can't stem the tide . . .

To sum it all up: I hate to see you do it, and yet I think you might as well go on and say "Data is easy to gather!"

ILLO GAUDITZ
Tacoma, Wash.

"Omnia mutantur, nos et mutamur in illis." *I.e., All things are changing, and we are changing with them.*—Ed.

DATES AHEAD

American Pharmaceutical Assn., annual meeting, Statler hotel, Boston, Aug. 22-27.

World Congress on Surface Active Agents, Sorbonne, Paris, France, Aug. 30-Sept. 3.

International Congress of Industrial Chemistry, Brussels, Belgium, Sept. 11-19.

American Chemical Society, national meeting, Statler hotel, New York, Sept. 12-17.

Federal Wholesale Druggists' Assn., annual convention, Greenbrier hotel, White Sulphur Springs, W.Va., Sept. 19-22.

Chemical Market Research Assn., fall resort meeting, Equinox House, Manchester, Vt., Sept. 20-21.

American Oil Chemists' Society, fall meeting, Radisson hotel, Minneapolis, Minn., Oct. 11-13.



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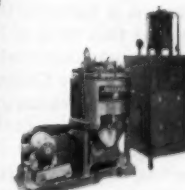


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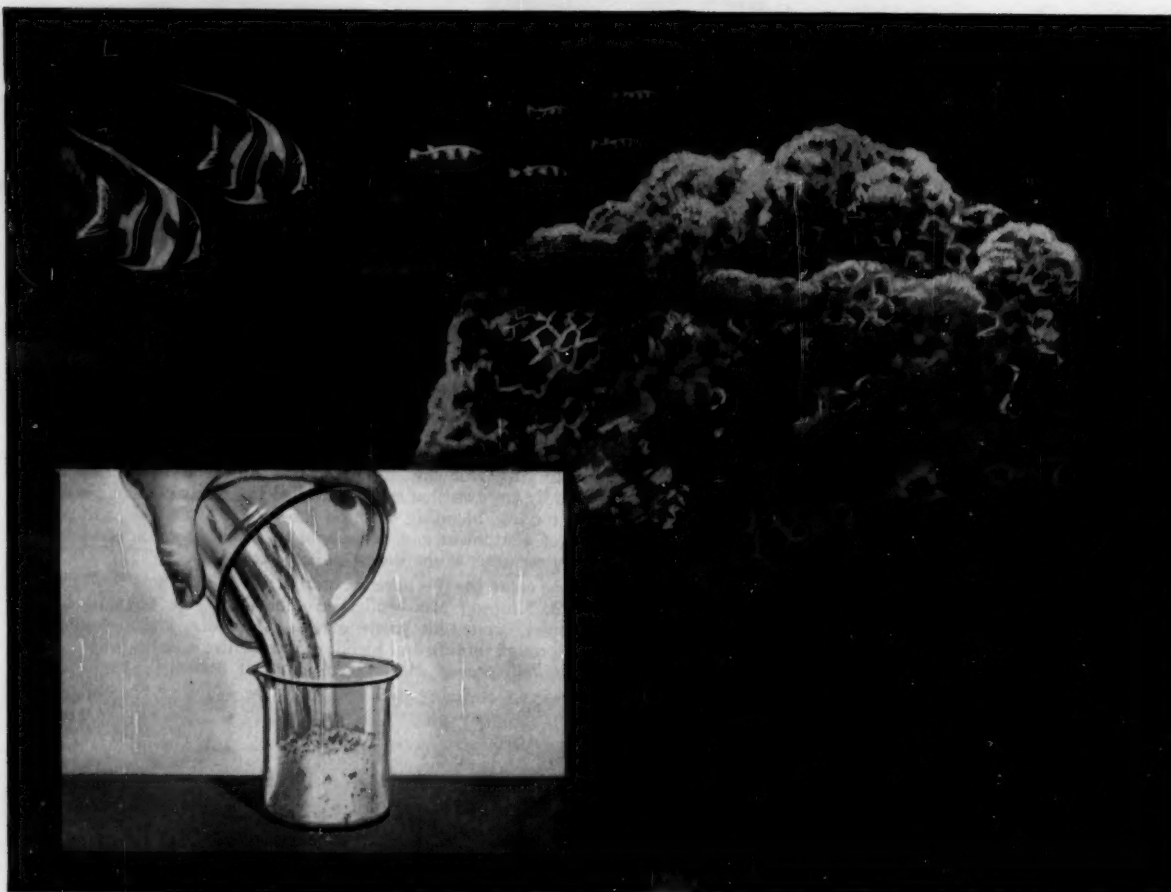
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NEWSLETTER

Colorado—and Gov. Dan Thornton in particular—is enthusiastic about the possibility of an oil-from-shale plant in the western part of the state within five years.

Thornton made such a prediction after meeting with Union Oil executives in Los Angeles, reported that they were “enthusiastic.” In his view, Bureau of Mines work at Rifle, Colo., has succeeded in cutting production cost to the point where shale oil is almost competitive with crude oil. He envisions output of petrochemicals and fertilizers as an integral part of the hoped-for development.

Union Oil's chemical subsidiary, Brea Chemicals, Inc., is now the largest dry ice producer in the West. It just shipped its first tanker of carbon dioxide from its new, 70 tons/day plant at Brea, Calif., also operates an 80 tons/day plant at Santa Maria.

The Miller pesticide bill was on President Eisenhower's desk awaiting signature this week. It saw passage by the Senate last Tuesday. The House, on Thursday, accepted a Senate amendment which allows the Food and Drug Administration to charge manufacturers for setting a tolerance on new pesticides.

There's some chance that a second food and drug measure may also clear Congress this session, though this one won't make substantive changes in the law. The House passed the Food and Drug recodification bill, and sent it on for consideration by the Senate.

Secrecy wraps over a corner of the U.S. work with chemical and biological warfare has been lifted. The Chemical Corps revealed that the “phosphate development works” at Muscle Shoals, Ala., has begun to make “dichloro,” intermediate in production of nerve gases. The plant, under construction since December, 1950, cost about \$50 million, was designed by Vitro Corp. and built by Southern Constructors.

Still under construction: a reduction unit that will convert used phosphorous oxychloride back to phosphorous chloride for recycle (CW Market Letter, July 3).

Actual manufacture of G-gas agents will continue to be carried out at Rocky Mountain Arsenal, near Denver. The Edgewood, Md., arsenal is the location of the G-gas pilot plant.

On the biological warfare front, it has just been officially revealed that the Pine Bluffs, Ark., arsenal is the site of the Chemical Corps' multi-million-dollar production unit, though this is not the only installation where BW work is carried on. Over one-third of the cost of the plant—built by Blaw-Knox—is accounted for by safety provisions, separate heating and ventilating systems, thick walls.

There's been no decision on whether any BW research or production operations can be turned over to private contractors (CW Newsletter, Feb. 20). There are still “gray areas” that must be ironed out before any concrete negotiations can be undertaken.

Incidentally, there has been a technological breakthrough in identification of BW agents. The Corps is using a device containing a very thin

filter to trap bacteria. Unknown bacteria can now be identified within 15 hours—about one-sixth the time previously required.

•
Close to \$6 millions' worth of chemical process facilities have received fast tax write-offs from Office of Defense Mobilization:

- Barium & Chemicals, Inc. (Willoughby, O.), \$3,576,900 at 70% for barium and strontium compounds.
- Schenley Distillers (Kansas City, Mo.), \$2,060,500 at 50% for ethyl alcohol. (This certificate had previously been denied.)
- Firth Sterling (Trafford, Pa.), \$64,450 at 65% for zirconium alloy ingots.
- Courtland Laboratories (Los Angeles) \$38,910 at 75% for gamma globulin.

•
The Administration scores the settlement of atomic strikes at Oak Ridge and Paducah as a big victory, but in some respects it raises almost as many issues as it solves.

For one thing, the settlement between the CIO Chemical Workers and Union Carbide, the Atomic Energy Commission contractor puts Secretary of Labor Mitchell in the saddle as the Administration's No. 1 troubleshooter; and this, because of Mitchell's cabinet status, brings labor management fights closer to the White House—just where President Eisenhower doesn't want them.

For another, the agreement to review labor relations problems at AEC installations may, in the long run, have the effect of undermining rulings by the panel set up to study just such matters. It also raises a question of AEC employees' status: Do they have the right to strike—as employees of a private concern, or are they government workers?

•
Two mergers are in the wind this week:

- Pittsburgh Plate Glass plans to acquire Natural Products Refining Co., Jersey City, N. J., manufacturer of potassium chromate and sodium bichromate. The two have entered into an agreement "looking toward the transfer . . . of the assets and business."
- Fluor Corp. (Los Angeles) and Singmaster & Breyer (New York City) are negotiating on a proposed consolidation.

•
Fluor also figures in the news this week as a participant in the formation of Texas Butadiene and Chemical Corp., which will build a butadiene and alkylation plant in Texas (CW Newsletter, July 10).

•
Further developments in fast-moving isocyanates (see p. 66): Du Pont has just been issued two U.S. patents (2,683,144; 2,683,160) on polymerization and preparation, respectively of aromatic isocyanates.

•
Industry-government partnerships are behind two new projects:
• Dow Chemical will boost its titanium output from the current 600 lbs./day to 10,000 lbs./day two years hence under an agreement with General Services Administration whereby GSA will buy up 2 million lbs. if Dow can't sell it elsewhere.

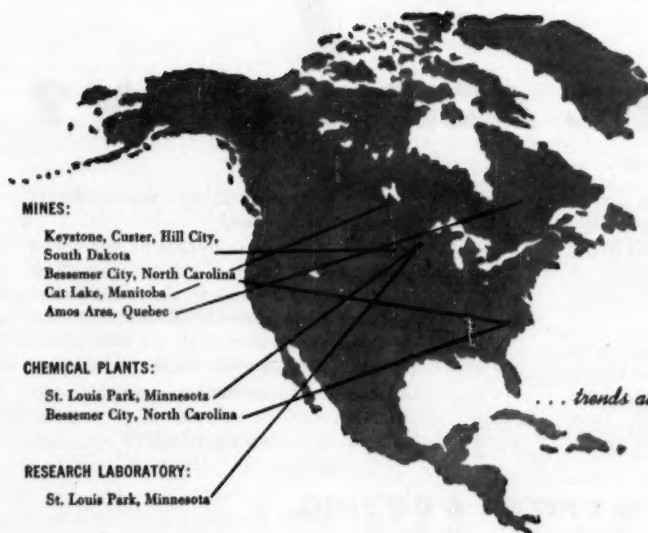
• Standard Oil (Indiana) has contracted with the U.S. Air Force to build and operate a solid rocket propellants research and testing station at Seymour, Ind.

. . . The Editors

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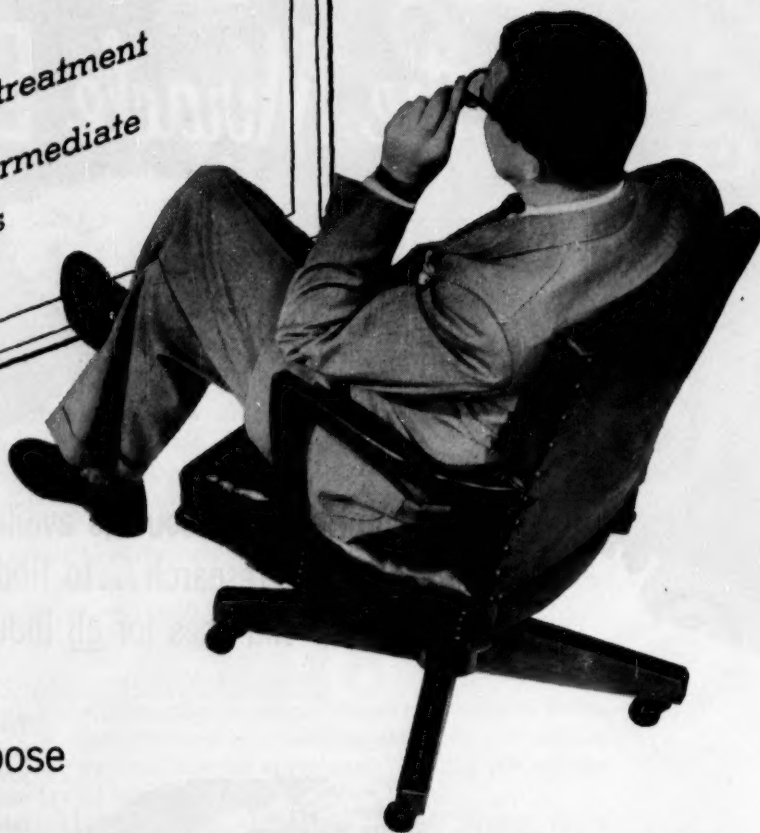
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July 17, 1954 • Chemical Week

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PFIZER CITRIC ACID
...as an ingredient
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...as a sequesterant
for industrial water treatment
...as a chemical intermediate
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Manufacturing Chemists for Over 100 Years



BUSINESS & INDUSTRY. . . .

Off to a Slow Start

The government's purse strings—through the Small Business Administration—are gradually loosening, but the chemical industry isn't getting much of the riches. That's the word from Washington this week as the count—over the first six months of 1954—went up on the scoreboard. In toto, 487 loans, amounting to \$28.6 million have been granted by SBA—nine of which went to chemical companies. In dollars, chemical loans totalled \$854,000, of which \$693,000 was put up by SBA, the remainder by local banks.

It isn't for lack of interest, however, that the tally's so light. In all, 49 chemical companies have applied for SBA loans worth \$3.5 million . . . more than five times the number accepted.

Lucky Recipients: Policy requires that SBA doesn't reveal the names of companies seeking loans until the funds are actually disbursed. But in addition to the three loans made to chemical companies earlier in the year (CW, March 6, p. 21) the following have received funds to "stimulate growth."

- Sure Seal Corp., Salt Lake City, Utah; \$250,000. Government share: \$150,000.
- Zac-Lac Paint and Lacquer Corp., Atlanta, Ga.; \$100,000. Government share: \$70,000.
- Chemical Insecticide Corp., Brooklyn, N.Y.; \$90,000—as a direct government loan.
- Hamilton-Bailey Engineering Co., Danville, Ind.; \$14,000. Government share: \$12,600.
- Angelus Aircraft Co. (manufacturers of laminating materials), Los Angeles, Calif.; \$125,000—as a direct government loan.
- Tri-State Chemical Co., Henderson, Ky.; \$80,000. Government share: \$60,000.
- Meadow City Gas Co., Las Vegas, Nev.; \$30,000. Government share: \$21,000.
- Daniel H. Jones Laboratory, Inc., Camden, N.J.; \$15,000—as a direct government loan.
- Klux Chemical Co., San Francisco, Calif.; \$150,000—as a direct government loan.

An important aspect of SBA's pro-



SBA'S BARNES: Still optimistic about government loans.

gram is "bank participation" loans in which the government encourages private lenders to assume a share of the financial burden. Hence the tendency, whenever possible, to accept loans in which the government takes over part—not all—of the obligation rather than those in which the government pays all.

That, notes one Washington observer, may be part of the reason why loans to chemical companies haven't been especially plentiful. Most of the companies that can get a bank loan take one covering the entire sum of money they need. Or many of them find it's more expedient to float a new stock issue. Only a few seem to have been able to offer the right combination to suit SBA's purposes.

The quota may start to pick up at any time; several score of applications are still pending decision.

Meanwhile, SBA Administrator Wendell Barnes is encouraging more small chemical companies to investigate the chance to thrive and grow with government assistance. His prediction: the number of loan requests will continue to rise in the months ahead—and SBA's investigation program will pick up both speed and dexterity.

Whether chemical companies will rise to the bait remains to be seen.

Clamor for Free Trade

Trade-hungry Japanese chemical manufacturers are clamoring for further lifting of embargo restrictions to Red China this week. And they're using official statistics to back up the contention that Western European producers are taking unfair advantage of Japan's position (due to "America's inconsistency").

Leading the hue and cry: Japanese importers—who want to boost imports of such key Chinese products as salt, coking coal, tungsten, tung oil and soybeans.

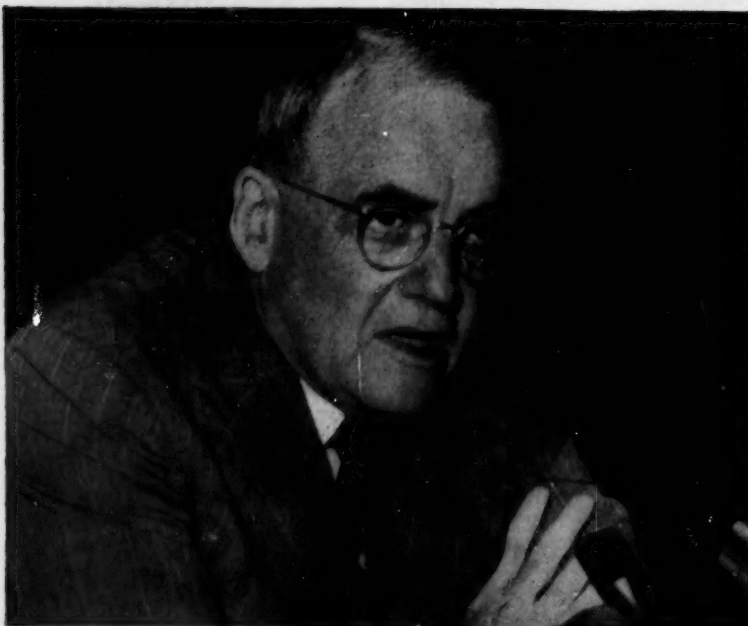
That it's the importers who are leading the drive for restriction-lifting, of course, supports the contention of the Ministry of International Trade and Industry who point out that the bulk of Japan-Red China trade is outside the reciprocal agreement framework anyway—is virtually a one-way street from Peiping to Tokyo.

But up until this week the Japanese government was holding firm to the conviction that Japan must go slowly in lifting its embargo. That it was progressing is self evident. In the latest relaxation list (published May 13) 23 items were removed from the banned list; another cross-the-board pronouncement is due soon.

Further evidence of how the trend is moving gradually: in latest industry round-up figures, Japan is reported to have shipped out more antibiotics to China in the month of March alone than it did in the entire period Nov. 1, 1953–Feb. 28, 1954.

Beside the "too slow, too restricted" lobbyists, there's another group currently besieging the Japanese government too. It's still a small, but active "free trade" party—led by the China-Japan Trade Promotion Society—a group responsible largely for the £63 million sterling reciprocal trade agreement with China last fall. Though officially still unrecognized, its agreement has proved to be the talking-point for subsequent trade relaxations—and may be, if predictions run true to form, the nucleus of long-term Japanese-Chinese trade pacts in the years ahead.

At the moment, however, the Society's protests are becoming ever more outspoken, could cause serious government reconsideration soon.



SECRETARY DULLES: For ex-enemies, a chance to regain U.S. chemical firms.

Retroactive Asset Recovery

All of a sudden, it began to appear last week that Congress is really close to the point of doing something in a big way about solving the alien property riddle—and the solution now being considered by the lawmakers seems to pose some far-reaching implications for the U.S. chemical industry.

Up until last week, the newly introduced Dirksen-St. George bill (CW, June 12, p. 12) was expected to get precisely nowhere during this Congressional session, which is slated to end in just a few more weeks. But then Secretary of State John Foster Dulles—with at least tacit support of the White House—testified in favor of that bill, which would return to their former owners the roughly half billion dollars' worth of German and Japanese assets seized by the U.S. government during World War II.

Under the Dirksen-St. George bill, those formerly enemy owners would receive either their old property or its cash equivalent. Possible consequences for the chemical industry in the U.S.:

- The \$140-million General Aniline & Film Co. might be handed back to Interhandel, the Swiss holding company that has claimed GAF ownership since 1940.

- Chemical companies that already have been sold to U.S. citizens following seizure during World War

II might become subjects of litigation, with their former owners seeking the money received by the U.S. government when the seized stock was sold.

- Title to numerous U.S. patents on chemical products and processes might revert to former owners in Germany, Italy and Japan.

Beefed-up Competition: A further consequence of these developments could be a material strengthening of chemical industries abroad, particularly that of Germany, which was most active in the U.S. before the war. If the Germans don't get back their old plants and patents, they may get instead a considerable wad of cash.

Speaking to the Senate Judiciary subcommittee that's considering the bill, Dulles said the proposal would be in line with present U.S. foreign policy of strengthening the friendly governments in Germany and Japan. He argues that confiscation of enemy assets was wrong in the first place, that it violated traditional American recognition of private property rights. Returning the assets now, he adds, would help convince the Germans and Japanese of our willingness to count them in as full partners.

From another federal agency comes opposition to the Dirksen bill. Justice Dept. officials in charge of alien property point out that some \$225 million worth of assets already have been

sold, and the proceeds allotted to payment of claims of U.S. citizens who suffered at the hands of Germans and Japanese during the war. Also, they point out that both Germany and Japan have agreed to pay their own nationals for losses resulting from U.S. seizure; hence, they reason, what's proposed would amount to making the U.S. taxpayer bear a burden already assumed by Germany and Japan.

Industry Reaction: GAF management, which still is under federal control, was unable to testify on the Dirksen bill. But a spokesman for GAF workers denounced the measure, said they don't want to return to working conditions that prevailed under the pre-1939 direction of the I. G. Farben trust. The employee representative said GAF old-timers fear "insecurity and uncertainty of employment under foreign ownership."

Equally stout opposition to the bill was voiced by Schering Pres. Francis Brown, who asserted that even restoration of key patents would undermine Schering's competitive position relative to the German parent company. This, he contends, would be unfair to the people who invested in Schering on the basis of a definite understanding about those patents.

Other points raised by Brown:

- Schering had an estimated \$1.3 million value when it was seized, then grew to the point that it was sold for more than \$29 million. To pay the German firm \$29 million would be to give it an unnecessary bonus.

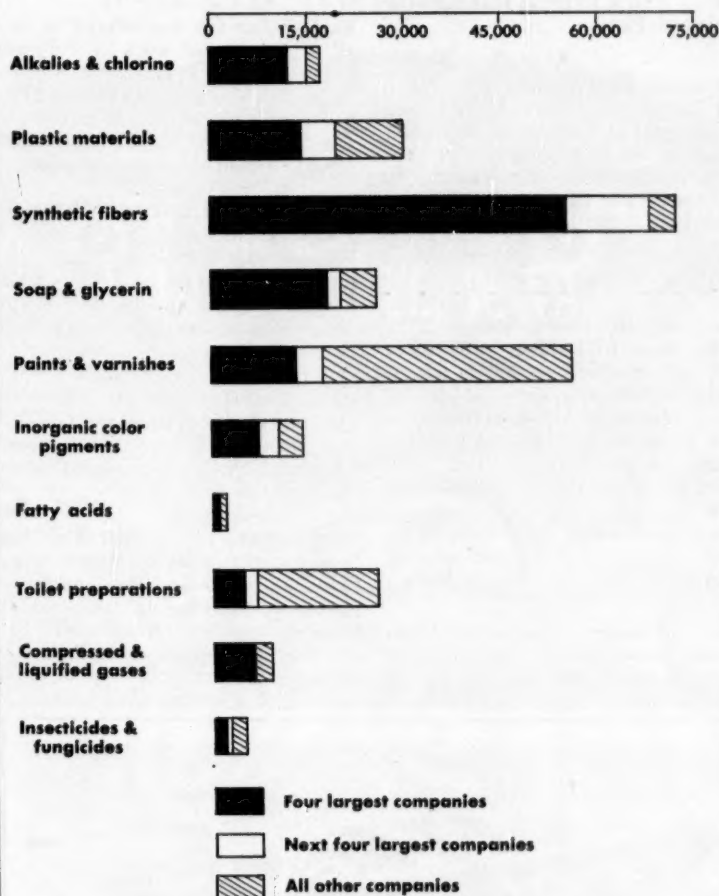
- Return of seized assets to the German chemical industry would tend to strengthen resurgent cartelization.

- The proposed law would strain U.S. relations with South American countries that—at U.S. urging—had reluctantly seized German chemical company assets during World War II, now would be under pressure to return those properties.

Administration support and the absence of visible opposition in Congress make it look as though the long gamble of the dispossessed owners might pay off. Final passage of the law this summer is unlikely, but proponents figure they're over the hump, and that things can't help but go their way next year. But chemical industry spokesmen might well be inclined to fight a delaying action, insisting that Congress should not be hasty about upsetting a vital domestic industry out of sudden kindness to foreign rivals.

HOW BIG IS BIG?

(Distribution of employment in various branches of chemical industry, 1950)



Gauge for Industrial Giants

Have the numerous company mergers over the past two years made the chemical process industries a tempting target for federal prosecution under the 1950 anti-merger amendment to the Clayton Act?

As of this week, the answer appears to be "No"; but chemical companies that are contemplating mergers in the future might be well advised to look at the latest Federal Trade Commission report on "Changes in Concentration in Manufacturing" before they make the plunge.

In publishing this report, FTC is giving fair warning about one of its newer methods to detect symptoms of incipient monopoly in any given industry. FTC has begun keeping track

of how big the largest companies in each industry are in comparison with their smaller competitors. This, of course, does not necessarily measure how competitive an industry is; but any marked increase in concentration in any industry will cause FTC investigators to scrutinize that industry for signs of stifled competition.

Two Yardsticks: The new report—issued in response to Congressional suggestions that FTC should keep a running account of industrial concentration on a trade-by-trade basis—contains initial concentration ratings under two systems. These two yardsticks, valid or invalid as they may be, are:

- Employment in the largest com-

panies in each industry compared to total employment in the industry. For example—as illustrated in the graph, above—the four largest makers of alkali and chlorine employ 71% of the workers in that industry, and the four next largest competitors retain 16%.

- Value of shipments made by the largest companies in each industry compared to total production in the industry. In the alkali and chlorine business, the four largest companies accounted for 70.1% of 1947 output, and the four next largest companies contributed 22.5%.

Washington Watchful: That FTC is going to be watchful for any situation that appears to cut competition or put a squeeze on smaller companies is confirmed by the agency's actions last week against the "big wheels" in the motorcycle and coin-lock making lines. An even better clue to FTC policy on mergers is the Commission's steadfast stand in the Pillsbury case, which now is back before the trial examiner for re-consideration.

The complaint had been filed because of Pillsbury's acquisition of two smaller milling companies that together supplied a large share of the Southeast's market for flour and mixes. Last spring, Pillsbury re-sold one of those Southern mills, and FTC lawyers immediately asked that the new owner be added as a party to the suit, alleging that the sale was aimed at getting Pillsbury "off the hook."

However, one reassuring fact for firms planning to merge: In the Pillsbury case, FTC ruled that a decrease in competition must be proved, not just presumed, in order for an anti-merger case to be established. This means that industrial concentration is not to be considered inherently "evil" unless it actually operates to restrict competition.

No Trend Yet: In the chemical industry, no clear-cut trend on industrial concentration is apparent in this initial report. For one thing, it's well nigh impossible to determine just where the lines should be drawn in dividing these companies into narrow classifications; nor is it simple to decide who's competing against whom. For example, a maker of house paints and a maker of marine paints are hardly competing against each other, but in this report they're both lumped in with all other paints and varnishes manufacturers. Also, the chemical industry is still relatively young, and its principal divisions now are not always the same as they were ten years ago.

In a few branches of the chemical industry, FTC has noted minor changes in concentration between

1935 and 1950. The four biggest makers of synthetic fibers increased their share of shipments from 74.3% to 78.4%, while their share of employment inched up from 75% to 76%. Among makers of toilet preparations, the top four's share of employees went up one percentage point and their share of production dipped by 1.5%. In the field of compressed and liquefied gases, the four principal companies' share of employment dropped by 3% while their share of output climbed by 3.4%. The big four makers of soaps and glycerine raised their share of production from 74% to 79%, but the four leading concerns in the carbon black business saw their share of output slip from 81.0% to 78.3%.

Admittedly, these gauges of industrial concentration can't yield any real measure of competition within an industry. But they do seem likely to give companies at least a rough idea of whether any proposed merger would excite FTC attention.

EXPANSION

Cane Sugar: Imperial Sugar Co., Sugar Land, Tex., has revealed a \$3-million expansion plan to be consummated over the next six years. Present capacity: 2.5 million lbs. of cane sugar annually.

Aluminum: Reynolds Metals Co.'s subsidiary, Reynolds Alloys Co., will start a \$2.5-million expansion and modernization project at Sheffield, Ala., within the next few weeks. Major items in the plan: installation of four annealing furnaces, and processing equipment with a capacity of 90 million lbs./year of alumina.

Bisphenol A: Dow Chemical Co. has completed construction of facilities to produce bisphenol A, doubling its current capacity. Most of the expanded production will go into epoxy resins.

Hydroabietyl Alcohol: Hercules Powder Co. is expanding its Burlington, N.J., plant to double capacity of hydroabietyl alcohol. The Burlington site is also the location of Hercules' \$4-million plant, now under construction, to make dimethyl terephthalate.

Titanium Dioxide: National Lead Co. will start construction of new units to produce titanium dioxide at St. Louis. Additional capacity: 36,000 tons/year, with operation expected by the end of 1955.

Sulfuric Acid: Argentine Mining Co.

has decided to go ahead with plans to build a \$1.5-million (200 ton/day) sulfuric acid plant at Rico, Calif. Completion's scheduled for mid-1955. Output will be funneled mainly to uranium mills within a 100-mile radius on the Colorado Plateau.

Ammonia: Food Machinery & Chemical Corp. will build anhydrous ammonia units at Westvaco's chlor-alkali plant in South Charleston, W. Va. The multimillion-dollar project, to have a 60 ton/day capacity, will be completed in the third quarter of 1954.

COMPANIES

More company incorporations:

- American Lithium Chemicals, Inc. has been incorporated in Dover, Del., with capital listed at 10,000 shares of common stock, no par value.
- American Minerals & Chemicals Corp. has been organized and registered in Dover, no capital listed.
- Canadian Chemicals, Inc. has been incorporated in Buffalo, N.Y., with a capital of 200 shares of common stock.

The Carborundum Co., Niagara Falls, is well along the way with plans to establish a new subsidiary in Puerto

Rico, to manufacture bonded abrasive products and electrical components. It will be built at Mayaguez; installation of production equipment is due to start in October.

Eagle-Picher Co. has offered to buy all of the capital stock of Fabricon Products, Inc. Price: \$9.9 million. Eagle-Picher has options to buy 271,545 shares (or 90.5%) at \$33/share, and is offering to buy the remainder (28,455 shares) at the same price.

Allied Chemical & Dye Corp., New York, has purchased (for about \$2.5 million) the Williams Roofing Co., Little Rock and its subsidiary—Artex Roofing Co., San Antonio, Tex. Allied will operate its new properties through its Barrett Div.

Integration of five major industrial-agricultural operations of the Clidden Co., Cleveland, has resulted in a new Chemurgy Div. with headquarters in Chicago.

Southwestern Engineering Co. has been awarded a \$4 million contract to build a petroleum refinery for Companhia de Petroleo da Amazonia at Manaus, Brazil. Construction will begin late this summer; completion is scheduled by late 1955.



A Million—Not Counting Cows

MID HOOPLA AND LUSTY ENTHUSIASM, Houston, Tex., claimed its first million in population. And adding to the fanfare, chemical companies along the Ship Channel sponsored a contest to estimate

the number of persons employed by the industry in Harris county. Winners (see cut) received an air tour of the area—by Trans-Texas Airways' Starliner, on July 1—Industry Day.

Now— a New High in Quantity and Quality

MALEIC ANHYDRIDE AND FUMARIC ACID

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NEW NATIONAL ANILINE PLANT at
MOUNDSVILLE, W. VA.

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NEW MALEIC ANHYDRIDE "TABLETS"

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We will be pleased to submit samples, technical data and prices—for immediate delivery.

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CHEMICAL CAPITAL

	Heavy Chemicals (Inorganic)*	Fertilizer	Agricultural Chemicals	Fats, Oils, Soaps, Paints	Electro- chemicals	Organic Chemicals	Pharmaceu- ticals	Plastics	Fibers, Films	Others
ARGENTINA	✓				✓	✓	✓	✓	✓	✓
AUSTRIA†	✓									
BELGIUM†			✓	✓			✓	✓		✓
BURMA	✓	✓								
CHILE	✓					✓				
COLUMBIA	✓	✓						✓	✓	
DENMARK†								✓		
DOMINICAN REPUBLIC		✓	✓							
ECUADOR				✓						
EGYPT		✓								
EL SALVADOR		✓	✓			✓		✓		
FRANCE†						✓				
FR. AFRICA				✓						
GERMANY (WEST)†									✓	
GUATEMALA							✓	✓		
HAITI†				✓						
HONDURAS		✓								
INDONESIA		✓			✓					

†FOA insurance available to cover convertibility and expropriation risks. Turkish agreement covers only convertibility.

No Aid Like Self-Aid

Solidly backing the theory that there's no aid like self-aid, the Foreign Operations Administration this week is poised on the brink of a new drive to encourage investment of chemical capital abroad. Its purpose is threefold: (1) to support U.S. government tax concessions to companies overseas; (2) to encourage foreign governments to improve their investment potential; and (3) to develop information on specific opportunities for investment in foreign countries for the benefit of the U.S. chemical industry. Altruism, however appealing on an emotional plane, won't be the FOA's chief selling point to the chemical industry, however. Realizing that dollars and cents spell logic to most chemical executives, it has prepared a comprehensive survey and has had its technical missions gather data from countries throughout the world to indicate "serious need of investment capital" in various fields. The over-all result (see chart) gives an on-the-spot picture of what's needed and where.

Quantitatively, the results so far list 37 countries with some degree of investment prospects for chemical companies, and more are likely to be added in the months ahead.

But that's only part of the story. Many countries cite particular commodities that are in short supply, suggest items which, if domestically produced, would find immediate (and presumably financially rewarding) acceptance on a wide scale. For example:

- Argentina suggests that under the general heading, electrochemicals, it particularly needs investment in refractories and carbides; in organic chemicals, carbon black and dyestuffs; in fibers, synthetics of all types; and under all other, pigments.

- Belgium notes a special desire for paints and detergents, explosives and pigments.

- Chile seeks chemical investment in petrochemicals.

- Colombia wants a more substantial artificial fiber industry, would

welcome U.S. investment and support.

- The Dominican Republic lacks fertilizer mixing plants, agricultural formulation units.

- Ecuador wants oil processing investments.

- El Salvador needs solvent producing plants.

- France wants aid in construction of petrochemical facilities.

- French Africa indicates a desire for backing in building oil processing units of all kinds.

- West Germany still lacks synthetic fiber production facilities, would accept U.S. aid in either partial or total financial backing offers.

- Haiti wants oil processing production plants.

- Indonesia says it needs aluminum-producing facilities.

- Iran states a preference for nitrogenous fertilizers and petrochemicals—"to secure a footing in world chemical trade."

- Jordan needs help in building potash recovery units.

WHO WANTS WHAT?

	Heavy Chemicals (inorganic)*	Fertilizer	Agricultural Chemicals	Fats, Oils, Soaps, Paints	Electro- chemicals	Organic Chemicals	Pharmaceu- ticals	Plastics	Fibers, Films	Other
IRAN		✓				✓		✓		
ISRAEL†	✓						✓			
ITALY†								✓		
JORDAN	✓									
LEBANON				✓				✓		
LIBERIA				✓						
NICARAGUA				✓						
NORWAY†					✓	✓		✓		
PAKISTAN	✓			✓			✓			
PANAMA				✓						
PERU		✓								
PORTUGAL†				✓			✓			
PORTUGUESE AFRICA				✓					✓	
SAUDI ARABIA		✓								
SPAIN†	✓						✓	✓		
TAIWAN (FORMOSA)†				✓					✓	✓
THAILAND	✓	✓								
TURKEY†	✓	✓	✓	✓			✓		✓	
VIET NAM							✓			

*In some cases, may include not only inorganics, but also desire for overall chemical industry.

- Lebanon, Liberia, and Nicaragua all say they want oil processing equipment—would welcome aid from U.S. firms.

- Norway is short of calcium carbide facilities, would also welcome aid in building plants to produce acetylene-based compounds.

- Pakistan has a raft of needs, but wants most especially heavy inorganic chemical facilities (such as lime, soda, caustic units), soap-producing plants, and anti-biotic capacity. The latter, it notes, would involve special consideration, since it will probably be handled under a government monopoly.

- Panama needs oil processing backing.

- Portugal would like aid in building all classes of fats, oils, soap, and paint facilities—with a special emphasis on soap units.

- Portuguese Africa wants oil processing plants, needs photo film producing facilities.

- Taiwan has a yen for paint producing facilities, rayon plants, and abrasive units.

- Turkey—last but not least—needs

investment in all heavy inorganic-producing plants (with the single exception of sulfuric acid), nitrogenous fertilizers, oil-processing plants and rayon-producing capacity.

Open Offer: FOA hopes that domestic companies, when apprised of the opportunities open to them, will consider the launching or expansion of foreign operations—on the theory that such investment (by raising standards of living abroad) will help reduce the amount of financial aid the U.S. government may be called upon to make. It will welcome all inquiries on the subject, promises active cooperation with any company that desires to send representatives to Washington to talk over investment possibilities.

Another extra is possible too. If any company wants further information, FOA can get easily available (and up-to-the-moment) data by calling in supplementary reports from its field representatives and will arrange for chemical men to talk with FOA traveling consultants or government men and industrialists in the country involved.

Putting its cards on the table, FOA officials point out that in asking for information from its technical missions, it set up no criteria on what constitutes "an industry" in any country. Thus, a single listing of chemicals in one case can include heavy chemicals, fertilizers and agricultural chemicals, while in another it might be considered as three separate industries. Further: some listings include specific recognition of available raw materials; others don't.

But its purpose,—aid to U.S. chemical producers—FOA says is to point the way toward investment of capital abroad—especially for companies that don't have branches or representatives available to do the job for them. Example: one fertilizer company, which has already seen FOA officials, is now readying its plans for a new South American plant aided in large measure by the U.S. technical mission there.

How effective the new program will be remains to be seen. But if early interest in the project is any indication of what's ahead, there'll be a stream of company representatives lining up at FOA's door.

THE STRIKERS' STORY

(Number of man-days idle due to work stoppages
in chemical process industries)

REASON FOR STRIKE	1951	1952	1953
Wages, hours, fringe benefits	118,000	368,000	594,000
Union organization	16,100	42,800	36,900
Combination of union organization and wages, hours, fringe benefits	22,300	50,300	115,000
Other working conditions	42,700	157,000	73,200
Interunion or intraunion matters	2,110	1,230	6,300
Cause not reported	50	1,180	150
TOTALS	201,000	621,000	825,000

Past the High Point

You can't judge industrial relations trends in the chemical process industries by what's going on in the whole nation's industrial relations panorama. That chemical companies have labor problems peculiar to themselves is clear from latest figures on work stoppages. Last year saw a record number of man-days lost on account of work stoppages in the chemical industry—32.8% over the 1952 total (see table, above)—while for the country as a whole, work time lost because of strikes was down by more than 50%. On the other hand, chemical strike activity is up slightly so far this year; but for the entire nation, lost time for the first five months of 1954 has been 47% less than the corresponding idleness in early 1953.

However, there's reason to suppose that work stoppages at chemical plants will be on the downgrade for the rest of this year. By far the largest portion of last year's chemical strikes were for "economic benefits" (wages, hours, and fringe benefits); and it's expected that there'll be relatively no friction on this point until next spring, now that the steel settlement has firmed up the current pattern for 5¢/hour wage increases and various improvements in fringe benefits.

Relatively Few Involved: Number of persons involved in chemical strikes has edged up in recent years—20,000 in 1951, 30,400 in 1952, and 36,500 last year. (These figures include duplications whenever a certain employee group takes part in two or more strikes during one calendar year.) But even the 1953 figure is

relatively low, considering that average employment of production and maintenance workers in the industry last year was 551,400. Thus not more than seven (at the maximum) out of every 100 chemical employees were involved in work stoppages of all kinds during 1953.

Lost time in the chemical industry last year averaged just less than 1½ days per worker—an increase of less than three man-hours per employee over the 1952 figure.

There were 107 work stoppages in chemical process plants last year, according to the scorekeeping of the U.S. Bureau of Labor Statistics. This compared with 100 in 1952 and 67 in '51.

Recognition Strikes Rarer: Chemical strikes in which union recognition and/or union security had a part in the announced aims of the striking unions dropped to 19 last year, after having mounted to 24 in '52. This indicated a trend toward more stable relations between management and unions, with both parties more inclined to accept and live with each other. It also could be construed to reflect a more temperate attitude on the part of management in union organizing campaigns.

One thing for which chemical companies can be thankful: they've had only two strikes each year in the past three years over interunion or intraunion disputes. There were 68 such strikes in other manufacturing industries in 1952, 24 others at mining operations, and an even 200 strikes of a jurisdictional nature on construc-

tion projects—quite a few of which were for chemical companies. Nationwide total for this kind of strikes dwindled from 334 in 1952 to 275 last year.

Mostly for Money: As might be expected, the bulk of chemical work stoppages have been for the announced purpose of winning greater economic benefits. There were 29 such strikes in 1951, 50 in 1952, and 71 in 1953. "Purely economic" strikes accounted for nearly 71% of the industry's lost time. Throughout the country last year, there were 2,825 strikes of this kind: 1,798 to win higher pay, 23 to prevent wage cuts, 89 in behalf of higher wages and shorter workweek, 325 for more generous pension and insurance benefits.

In part, the increase in chemical strike activity can be laid to the fact that the industry has been expanding—more plants, more employees, more production. One contributing factor is that—for better or for worse—this industry has at least three major unions to bargain with. Some abatement in strike losses may be hoped for as a result of the recent no-raiding agreement between the AFL and CIO; but rivalry for wage increases may continue as a motivating factor in some work stoppages.

Bid from Wheatlands

Another state that feels it's lagging on industrial development is having itself analyzed for market potentials and raw materials availability—and it—like many another state—hopes that the chemical process industries are listening.

Kansas, the nation's champion wheat-producing state, has just been the subject of a six-month survey that revealed that this state of 2 million population has a "manufacturing deficit" in 19 industries totaling nearly half a billion dollars a year. What the Kansas Industrial Development Commission now suggests is that companies in those 19 industries build plants in Kansas to supply their products locally, keep Kansas dollars from straying too far afield, and give better balance to the Kansas economy, which now is overwhelmingly agricultural.

Among those 19 most-wanted industries, two are directly in the chemical process field (drugs, medicines and pharmaceuticals, and cosmetics and toilet goods). Others are good customers of chemical concerns (such as manufacture of textiles and paper). Also invited: companies that make wearing apparel, steel sheets, wood furniture, insulated wire and cable,

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LEADING SYNTHETIC DETERGENT PROCESSORS!

NEOLENE 400

INTERMEDIATE FOR SYNTHETIC DETERGENTS

From its introduction, Neolene 400 has been recognized for quality as a raw material for synthetic detergents and other surface-active agents of the alkyl aryl sulfonate type. Today Neolene 400 exhibits exceptional quality when used in the newest method of sulfonation — utilizing liquid SO_3 .

Neolene 400 is one of the many petrochemical products produced by Continental Oil Company. For Neolene 400, for slurry, or for finished detergent products, look to Conoco Petrochemicals. *Samples and technical information, based on pilot plant or commercial production, furnished by request on your letterhead.*

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CHEMICALS

AREN'T

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Paper, plastic or foil... you name it, Kennedy has it... and can convert it into an engineered or conventional package for your chemical products.

TOUGH!

Our engineers are qualified through training and experience to deal with the special problems of chemical packaging. And our mile-long line of men and machines is your assurance of uniform quality at lowest possible cost.

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(OFFICES IN PRINCIPAL CITIES)

Send me more information regarding Kennedy packaging for Chemical industry.

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LIME

ARSENATES

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EXPLOSIVES

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GLUE

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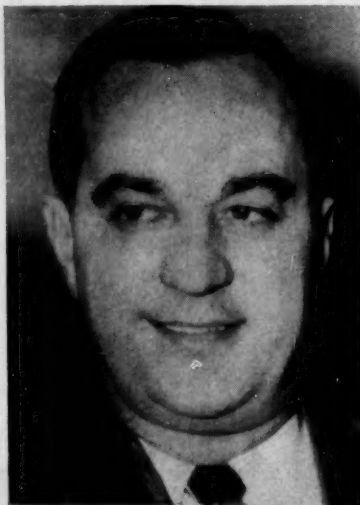
ABRASIVES

SULPHUR

ALKALIES

ACIDS

BUSINESS & INDUSTRY



GOV. ARN: In his state, plenty of oil, gas, salt, and a \$500-million market.

aluminum metal, various metal products, and radio, telephone and telegraph equipment.

Raw Materials Handy: As to basic chemical production, the Midwest Research Institute—which conducted the survey and authored the 540-page report—points out the possibilities and urges that help be offered to any chemical firms that might be interested in setting up business in the Sunflower State.

"Reserves of salt are very large in Kansas," MRI notes in broaching the chemical topic. "Small increases in production could occur, and the beginnings of a chemical industry utilizing salt as a raw material were made in the Wichita area in 1951. Everything possible should be done to encourage this 'breeder' chemical industry and to bring in potential customers for its products.

"Plentiful chemical industry raw materials exist in the state. These include, besides salt, limestone, fillers, agricultural lime, and gypsum. In addition, by-products of the natural gas and petroleum refining industries are abundantly present, and are assuming positions of great importance as potential raw materials for this industry."

MRI doesn't predict that Kansas will become "a large-scale petrochemical manufacturing center comparable to the Texas Gulf Coast"; but it insists that "there may well be opportunities in smaller scale operations." The economics of such enterprises, the institute recommends, should be more clearly defined.

Second-best Chances: In addition to the 19 industries deemed to have best chances for profitable branching out in Kansas, MRI finds another 210

industries in which the Kansas area deficit ranges from \$100,000 to \$4 million each year. Among these, several industries of chemical interest already are expanding locally: plastics, fertilizers, oleomargarine, prepared animal feeds, and various glass products.

The survey also takes into account the market for all these products in four bordering states.

Armed with all this information, Gov. Edward Arn and his Kansas Industrial Development Commission are planning to step up their campaign to "sell" more manufacturing firms on Kansas opportunities. Tactics under consideration: mailing portions of the report to all major investment banking houses, sending to principal companies in the 19 "Target A" industries data from the report and an offer to present more details on a person-to-person basis, and circulating appropriate information about prospects for expansion on the part of the other 210 industrial groups.


Not every chemical company will be excited by this new report on Kansas. But if every state were to follow the lead of Kansas and Oklahoma (CW, June 5, p. 16) in having its markets and resources assessed thoroughly, every "growth" company would be benefited.

Hopes Muffled?

Convertibility of major currencies into dollars—which would mean a big boost to chemical-exporting companies (CW, June 26, p. 20) may not be as close to actuality as some officials might believe. That was the opinion of the British Treasury last week as it readied itself for important meetings on the subject to be held this summer. Closest target date for monetary freedom: 1955.

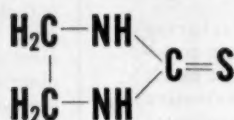
Prime reason for the delay, say British officials, is simple enough: lack of U.S. support through more liberalized trade policies plus "inadequate support of U.S. convertibility loans." There is also a strong conviction, harbored by many in Great Britain, that the currently good British payments position is far from steady and that there's more than a good chance that the U.S. will not spring back from its recession as quickly as Washington might hope.

Germans Cry: Loudest and most persistent plea for convertibility now is issuing from the West German Ministry of Economics in Bonn. It contends that the Deutschmark is ready for convertibility—and German chemical makers are becoming

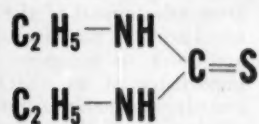
DOUBLE CHECKED  FROM RESEARCH TO INDUSTRY

THIOUREAS

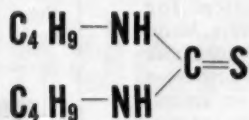
ETHYLENE THIOUREA



1, 3 DIETHYLTHIOUREA



1, 3 DIBUTYLTHIOUREA



All of these products have use as:

Antioxidants
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Diethylthiourea has been suggested as an intermediate for germicides.

Dibutylthiourea is being recommended as a catalyst activator for polyester resins.

All are available in commercial quantities.

Write for a copy of Sharples Report 53-3 on the use of diethylthiourea and dibutylthiourea for inhibition of HCl , H_2SO_4 , HF , H_3PO_4 , $(\text{COOH})_2$ and CO_2 -brine and H_2S -brine systems.



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MASKING ODORS FOR ECONOMY

In modern manufacturing techniques involving products or processes that result in offensive odors, extensive use of the industrial perfumer is being made. Whether the odor brings discomfort to plant employees, or detracts from sales appeal of the finished product, manufacturers are quick to recognize the importance of an olfactory remedy. In some instances elimination of the mal-odor can be effected by chemical means—but this is often a very costly procedure, particularly impractical for smaller manufacturers. Many paint solvents fall into this category as well as processes for fractionating or chemically treating lubricating oils. It is here that the industrial perfumer makes one of his most important contributions, by providing an effective masking odor tailored to the specific requirement, at a cost that will not disturb the manufacturer's entire pricing structure. The D&O Industrial Odorant Laboratories handle such problems swiftly and on an individual product basis. Consult D&O.



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increasingly vocal in their support.

Central Bank of Germany officials, however, aren't so sure. They would much rather, for both psychological and political reasons, prefer to see the mark converted only after the pound sterling has moved clearly in that direction.

Next move, in any international consideration of the problem, will undoubtedly come at the full-fledged gathering of the OEEC (the European Marshall Plan Council) due to meet in London late this month. But observers expect the Council to pass the ball, if it can, to the September meeting of the International Monetary Fund in Washington. Why? President Eisenhower, in his March 30 message to Congress, suggested that convertibility should be handled by the IMF and the Federal Reserve Bank. And European leaders, with the exception of German economists and chemical producers, seem to have fallen into line with his proposal.

If, however, convertibility loans become more difficult to obtain (as various European producers charge), there could well be more diplomatic agitation before September.

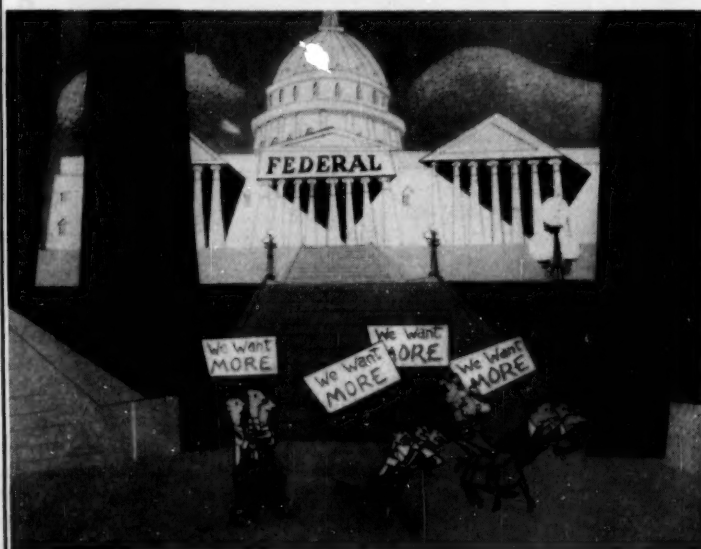
Big Business Now

Production of chemicals and pharmaceuticals in the Philippine Islands has passed the \$35-million mark according to latest reports from the Bureau of Census.

Heading the list of manufacturers: soap producers—with an annual output valued at more than \$14.1 million. Next in value of production: pharmaceutical companies—whose production of ethical and proprietary medicines is reported worth \$7 million.

Production of ammonium sulfate started in 1953 in a government-owned plant, reached 8,500 tons. Five paint and varnish manufacturers report sales of close to \$1.1 million.

Among basic chemicals currently produced in the Philippines, greatest output is being registered by caustic soda (1,384 metric tons), hydrochloric acid (433,571 lbs.), and sulfuric acid (1,293 tons). However, the only product reaching international channels is glycerine—which Philippine producers turned out at a \$1.6-million clip last year.



Human Selling with Humor

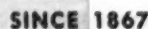
THE BUSINESS community, not infrequently accused of being humorless and pontifical in selling itself, now has some new evidence to refute the charge—thanks to a chemical company. Cartoon sketches like this one make up a 22-minute Technicolor film designed to dispel public misunder-

standing about things like profits, competition, advertising and taxes. Bouquets go to Du Pont for the idea and for footing the production cost (\$220,000), and to the U. S. Chamber of Commerce for distributing the film (\$15 for 30 days) to civic, professional, educational, and other groups.

H										C	N	O	F
Li													
Na	Mg								Al	Si	P	S	Cl
K	Ca	Cr	Mn	Fe	Co	Ni	Cu	Zn			As		Br
	Sr						Ag	Cd		Sn	Sb		I
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Let something go wrong at the beginning and there is often no cure, no way to avoid trouble, expense and rejections. That's why so many concerns start with Mallinckrodt chemicals. They're exactly right, always dependable, and most chemicals you might need are immediately available. In case they are not now in stock, in case you need special chemicals to meet specific problems — Mallinckrodt will help you in a hurry with the right chemical in the right physical form. An important advantage of a chemical plant like Mallinckrodt's is flexibility of research and production facilities.



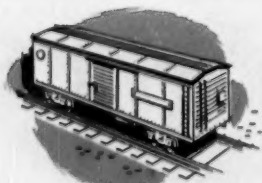
CHICAGO • CINCINNATI • CLEVELAND • LOS ANGELES • PHILADELPHIA • SAN FRANCISCO • MONTREAL • TORONTO

STOP BAG SLIPPING WITH...

Hudson's New



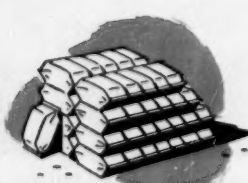
Stop this warehouse hazard!



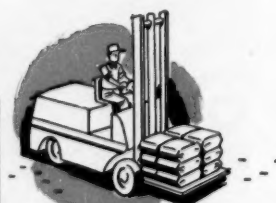
We humped a freight with half a carload . . . not a single Hudson Non-Slip Ink sack slid or broke!



Do you ship by truck? Buy Hudson Bags with Non-Slip Ink and watch your "Slip-break" losses shrink!



Non-Slip Ink puts an end to sacks sliding under their own weight and falling apart like a house of cards!



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Takes Skid Out of Your Bags!

Again Hudson puts your shipping problems "in the bag" for you ... with this exclusive, specially developed NON-SLIP ink.

What's more, there's NO EXTRA charge for this ink! Stack this up with all the other superior features of Hudson multi-wall sacks and you know you're buying the best bags money can buy when you make the order out to *Hudson!*

Here's Why:

Best Protection — cuts package loss caused by slipping — Takes rough handling in transit! Hudson strongest by far!

Less Re-Handling — because slipping in packing and storage is virtually eliminated — No double handling.

Free Moving — designed for perfect handling on chutes and conveyors.

Labor Savings — easier and faster to handle — No fumbling with Hudson's "Sure-Grip Multiwalls."

Send for complete story today!



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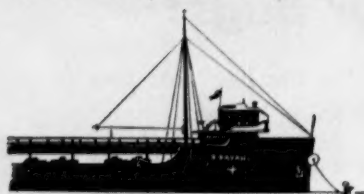
COMPANY _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____



IN THE PORT OF PHILADELPHIA



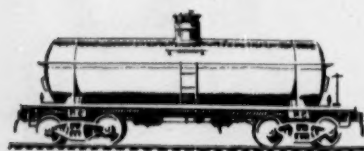
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Delaware River Terminal Corporation's deep water docks (32 feet at low tide) are easily reached from coastal and Atlantic sea lanes.



INDUSTRIAL HIGHWAYS

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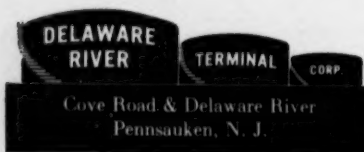


RAILROAD

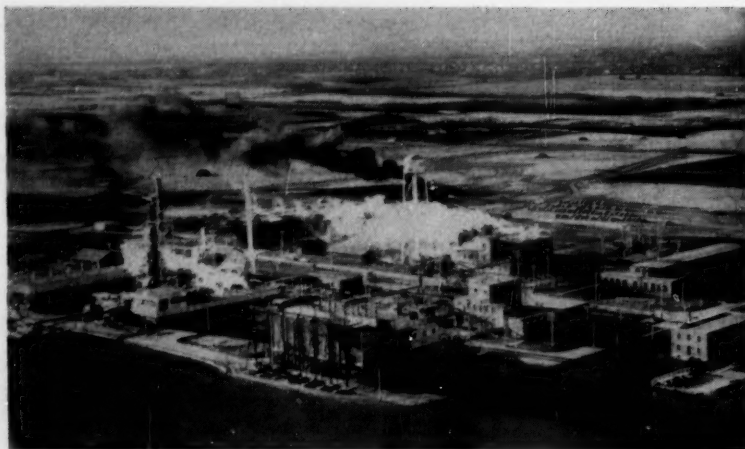
Good service on PRR freight lines. Tank car loading facilities.

Expanding capacity, too.

Forty acres available for additional facilities to be built to meet your specific needs. Write—our representative will call with details.



BUSINESS & INDUSTRY



POLYETHYLENE: CIL's plant at Edmonton now in full operation.

FOREIGN.

Polyethylene/Canada: Almost overlooked in the fanfare over Imperial Chemical Industries forthcoming Terylene plant at Millhaven, Ont. (*CW*, July 10, p. 26) is CIL's \$14 million polyethylene plant near Edmonton Alta.—completed late last year. Production is now coursing along close to capacity rates; company officials now expect that profits in its first year's operation will closely approximate company expectations.

Rayon/Japan: Japan's exports of rayon yarn to Communist China have been unusually active since April owing to a stepped-up sales drive, to outpace Italian and other Western producers. Current estimates are that before the end of 1954, China will be on the receiving end of more than 40% of Japan's total annual output—some 10 million lbs. of rayon yarn.

Insecticides/Mexico: Insecticidas Ortho, an affiliate of California Spray-Chemical Corp., has opened a new insecticide plant in Mexicali, Baja California. Included in the facilities: a dust mill to manufacture finished insecticides, units that can be converted to manufacture sprays. Ortho is aiming at the Mexican agricultural market, will staff the plant with Mexican personnel.

Tariffs/Germany: According to reports from the usually well-informed Düsseldorf newspaper, *Industrie-Kurier*, Herr Fritz Schaeffer, the West German Finance Minister, has proposed to the cabinet a wide range of tariff reductions on chemical products. Reduction would benefit all countries exporting to West Germany, would

lower hydrogen, chlorine, ammonia, phosphate fertilizer import duties. If accepted, the report goes on, it's likely that tariff reductions will range from a tenth to a third.

Contract Completion/Pakistan: Against keen U.S. competition, Fibreglass Limited, St. Helens, Lancashire, England, has secured the contract to supply about 10 million sq. ft. of fibreglass tissue pipe-wrap for covering the 350 miles of steel pipes that the Pakistan government will lay between Sui and Karachi to transport natural gas.

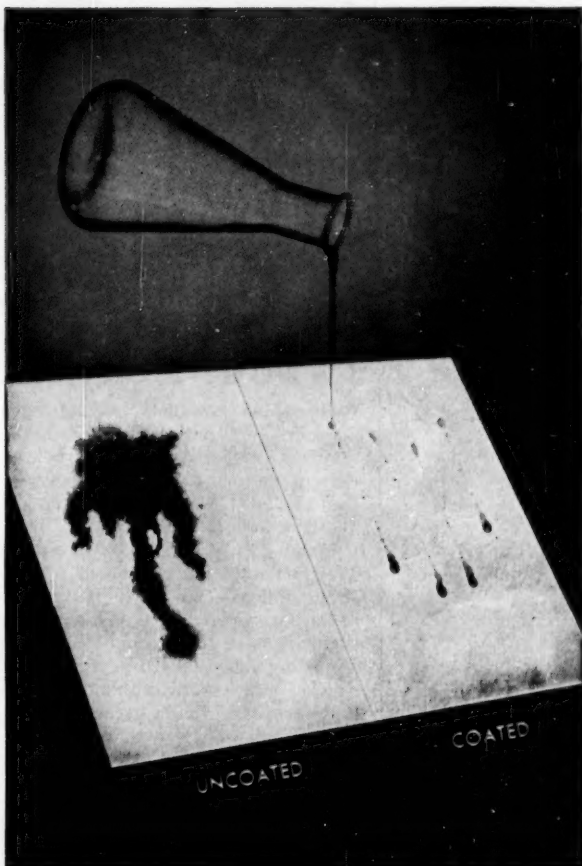
Glass/Korea: A contract for construction of the Republic of Korea's first flat glass plant was signed in Seoul on June 25 between UNKRA (which is providing the necessary funds) and Frazier-Simplex International Corp., a U.S. concern. Agreeing to the deal: the ROK government.

Plans call for construction of the \$2.1-million plant during the next 18 months at Inchon. Capacity: 12 million sq. ft. (about 6,000 metric tons) of flat glass per year. Frazier-Simplex agrees to supply a 13-man team to operate the plant until Korean personnel can be trained to take over.

Pharmaceuticals/Australia: Australian domestic production of pharmaceuticals increased close to 10% over 1953 output, but exports are dropping off due to competition from lower-priced foreign products, according to Australian Federal Government sources. Some imports have risen up to 200% over previous figures. This has resulted in price drops in locally-produced materials.

METHOCEL

forms tough, colorless coatings



This uniform, synthetic gum by DOW forms water-soluble films and coatings that resist most greases, oils and waxes . . . improves many products from capsules to paper sizings.

Here's a film forming material that can meet your most exacting requirements. Methocel® (Dow methylcellulose) gives you a sizing or coating that is tough, clear, strong and flexible. It is water-soluble, yet resistant to mostly all greases, waxes, oils and solvents. These coatings are tough right through a wide range of temperatures, too, minimizing breakage.

The effective thickening, binding, suspending and stabilizing actions of Methocel have also solved many problems of manufacturing economy and simplification. Offering you a greater viscosity range than any other gum, Methocel is available in nine types from 10 cps. to 7,000 cps. Five grades are available, including N.F. Grade, for applications requiring high purity. The broad pH range allowable with solutions of Methocel eliminates many formulating problems.

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EMULSION STABILIZER: Methocel acts as a protective colloid and depressant for the surface tension of water . . . improves paints, pharmaceuticals, cosmetics, polishes and latexes.



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Dichloroacetic Acid, a strong organic acid, undergoes the normal reactions of such acids. The two chlorine atoms offer many substitutive possibilities. For additional reactivity of the carboxyl group, the acid chloride, currently under development by Kay-Fries, should be of interest. To manufacturers of drugs, dyes, and general organic chemicals, these products offer many possibilities in synthesis.

dichloroacetic acid



KAY-FRIES SPECIFICATIONS

(Tentative)

purity: 98% min.
m. p.: 10.5° C. min.

TYPICAL REACTIONS



aniline or
subst. anilines

bis-(4-amino-subst.-
phenyl)-acetic acids

(In this reaction di-subst.-anilinoacetic acids may also be obtained.)



phenol

diphenoxycetic acid



sodium alcoholate

dialkoxyacetic acid

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B & I



GAS-COKE'S SWISHER: For stronger union, he'd sacrifice his own title.

LABOR

Motives for Merger: Nudging from "upstairs"—meaning from CIO's headquarters staff—seems to be behind current merger negotiations between the United Gas, Coke & Chemical Workers and the Oil Workers International Union. CIO President Walter Reuther is a believer in big, strong unions; occasional friction between Gas-Coke and OWIU—such as that which comes when both unions try to organize a petrochemical plant—makes him impatient about the continued separate existence of two relatively small unions with overlapping jurisdictions. (Gas-Coke has only about 80,000 dues-paying members, OWIU about 120,000, while Reuther's own United Auto Workers membership is more than 1.1 million.)

The fact that Gas-Coke President Elwood Swisher is taking the initiative in the merger talks shows that he'd be willing to relinquish his own position and title, because if the unification move goes through, it's to be expected that OWIU President O. A. (Jack) Knight—as leader of the larger group and as a more experienced labor chief—would emerge as top man.

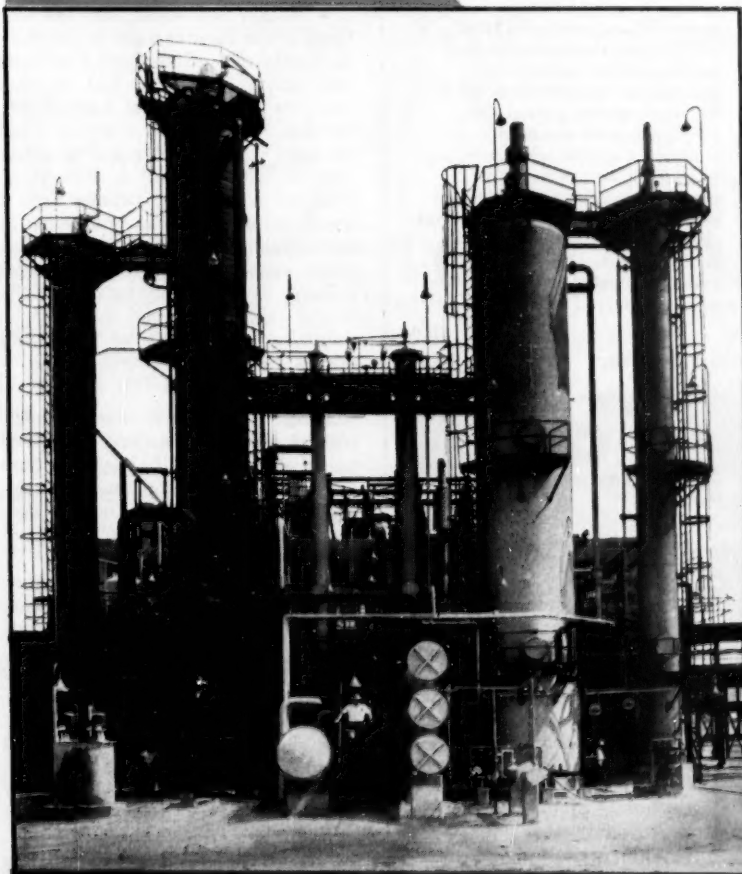
Preliminary points on which Gas-Coke and OWIU officials are agreed:

- Continued affiliation with CIO is "understood."
- Seniority of Gas-Coke officers and staff members will be respected, and most jobs will be saved.
- Ratification of any concrete merger proposal will be up to conventions of delegates chosen by rank-and-file members of both unions.

•
Strikes Folding: Two of the year's

First in U.S.A.

using **SD's** direct oxidation process

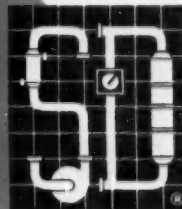


Nitrogen Division, Allied Chemical & Dye Corporation, is now in production at Orange, Texas, with commercial ethylene oxide and glycol of the high purity required for synthetic fibers and other important industrial uses.

This important contribution to chemical industry progress has been achieved through the first-time use, in America, of SD's direct oxidation process. The plant was designed and engineered by SD, and SD assisted in its initial operation.

This project, similar to the ethylene oxide and glycol facilities completed by SD last year for Naphtachimie of France, is another example of an SD plant completed on schedule . . . built within the budget . . . and operated successfully from the very first day.

In new plant construction or the revamping of existing facilities to increase production efficiency, you will profit by utilizing SD's specialized experience in organic chemicals plant design. Services are available to you, on a confidential basis, on any problem involving a process of your own, or one to be procured or developed.



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Executive Offices: 2 Park Ave., New York 16, N. Y. • Engineering Offices: Jersey City, New Jersey

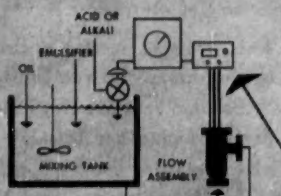
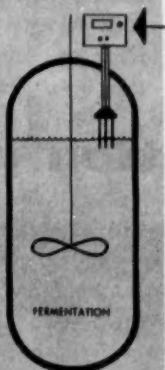
Let Beckman exact pH control

Superwise your production

TWO TYPICAL FIELDS OF APPLICATION

BIOCHEMICAL PROCESSING

Micro-organisms grow and enzymes act efficiently only within a narrow pH range. Any deviation reduces the yield—with a corresponding financial loss—and may even result in an entirely different product. Thus it is obvious why virtually every pharmaceutical manufacturer, distiller, brewer, etc. uses Beckman pH instruments to control reaction, and frequently the extraction and pH of the final product itself.



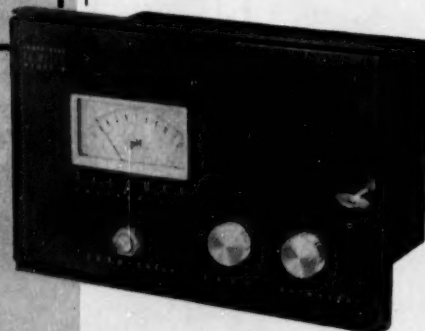
EMULSIFICATION

Lowering the surface tension of water to bring insoluble matter into suspension is a widely used procedure in ore flotation, laundering, and the production of pesticides, mayonnaise, cosmetics, foam latex, etc. Here continuous pH control in such a procedure means higher yields and lower ingredient costs which quickly pay for the installation.

Present-day living depends upon exactly controlled volume production of countless materials—foodstuffs, beverages, medicinals, drinking water, and hundreds of process ingredients. Precise pH regulation provides one of the most important means of controlling processes involving aqueous fluids.

Beckman, the pioneer in this field, now offers the Model W Industrial pH Meter which provides new dependability, new convenient size, new maintenance ease (through plug-in units), and new facility for process automatization.

The Model W utilizes Beckman's virtually indestructible glass electrodes, reading accurately even in boiling caustic. These can be mounted in flow or immersion assemblies as far as 200 feet from the instrument. One unit can monitor, manually or automatically, six different points in the process system, giving either simple indication or automatic recording. Complete automation can be achieved through the use of standard recorder-controllers. Scores of manufacturers are taking advantage of the practically unlimited control possibilities offered by the Model W to improve quality, speed production, increase yield, and cut costs.



For more detailed information in regard to the Beckman Model W Industrial pH Meter send for Data File 89-17

Beckman division

BECKMAN INSTRUMENTS, INC.
FULLERTON 1, CALIFORNIA

B & I

more notable chemical work stoppages ended suddenly and silently last week. In another case, a chemical plant was shut down because of a strike halting production at plants of major customers.

- The first strike in the 11-year history of Monsanto's Texas City plant lasted 18 days, was settled with a 9¢/hour wage increase. This was a compromise between the company's 7¢ offer and the original 15¢ demand by the Galveston Metal Trades Council (AFL).

- At Niagara Falls, N.Y., about 1,300 members of Local 250, United Gas, Coke & Chemical Workers (CIO), have returned to their jobs at the Electro-Metallurgical plant after a 12-day strike. Their walkout was in protest against the suspension of five fellow-workers who had been suspended for three days for stopping work to express their dissatisfaction over their job descriptions.

- Within two weeks after the outbreak of the lumber strike in the Pacific Northwest and northern California last month, Monsanto had to shut down its phenol plant at Avon, Calif., because the work stoppage had clamped down on plywood manufacture, in which phenol is used as an adhesive component. Oronite says it hasn't curtailed phenol production at its Richmond (Calif.) plant yet, because increased sales to the plastics industry have made up for most of the loss of sales to plywood makers, who normally take 60-65% of the plant's output.

Raiding Remains: Recent chemical plant bargaining elections conducted by the National Labor Relations Board included several cases of "raiding," even though the unions concerned had signed the AFL-CIO no-raiding agreement.

- Gas-Coke retained bargaining rights at the National Carbide plant at Calvert City, Ky., despite a raiding attempt on the part of the International Assn. of Machinists. Result of the voting: Gas-Coke, 140; IAM, 39; no union, 4.

- The strife-ridden International Chemical Workers Union (AFL) was displaced by the United Rubber Workers (CIO) as bargaining agent at the Henrite Products Corp., Ironton, Ohio. Of 399 workers eligible to vote, 196 cast their ballots for URW.

- Three smaller victories for Gas-Coke came at the Linde Air plant in Kittanning, Pa.; Reichhold Chemical, Ballard Vale, Mass.; and at American Cyanamid's laboratory dept. in New Orleans.

LUMMUS TO BUILD FIRST HIGH-PRESSURE ACETYLENE DERIVATIVES PLANT FOR GAF

The first commercial installation in this country for the manufacture of acetylene derivatives through high pressure techniques based on Reppe Chemistry has already passed design stage. The entire project including engineering and construction has been entrusted to The Lummus Company by General Aniline and Film Corporation—pioneer of high-pressure acetylene technology in America.

GAF research and development groups have carried investigation from laboratory scale to the building of the first U. S. pilot plant at Linden, New Jersey in 1949. Since that time, more than 30 new chemicals have been produced in semi-works quantity.

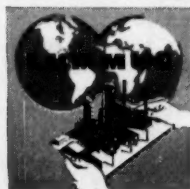
Experience gained in daily operation of the pilot plant forms the basis for design of the \$6,000,000 commercial unit at Calvert City, Kentucky—scheduled to come onstream in late 1955.

The plant involving high pressures will supply chemicals now unavailable in industrial quantities.

Among the products to be made initially are propargyl alcohol, butynediol, 1,4-butanediol, butyrolactone, 2-pyrrolidone, methylpyrrolidone, vinylpyrrolidone, and polyvinylpyrrolidone (PVP). These products have already achieved industrial applications in such fields as pharmaceuticals, cosmetics, textile auxiliaries, plastics, plasticizers, solvents, explosives, and fine chemicals. In a subsequent step, vinyl alkyl ethers and esters and their polymers and copolymers are also scheduled to be produced at the Calvert City plant.

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BUSINESS & INDUSTRY



VICTOR'S MONTANA PLANT: At issue in high court, taxes at 7% or 30%

LEGAL

Tax Incentive Suit: If Montana's 1951 industrial incentive law—aimed at encouraging new plant construction in that state—is found to be in accord with Montana state constitution, the first beneficiary will be Victor Chemical Works, whose phosphate plant near Silver Bow is involved in a test suit over that law's validity.

The law provides that new industrial property will be assessed at only 7% of full value for the first three years, instead of at the normal 30% rate. Silver Bow County officials—relying on an opinion by the state attorney general that the 1951 statute was unconstitutional—levied and collected taxes at the higher rate, and Victor brought suit for recovery of \$14,666 paid under protest. District court ruled against Victor, and the case now is pending before the state supreme court at Helena.

Blame for Blast: A grand jury may be asked to determine whether anyone should be held responsible for the fire and explosion that killed six persons at the Wilson-Kelth Pharmaceutical plant in South St. Louis, Mo., last month (*CW*, June 19, p. 18). A coroner's jury found that the blast was accidental and that what exploded was a mixture of ingredients being made into pellets for military flame-throwers. However, Asst. Circuit Attorney Richard Dempsey said testimony before the coroner's jury would be reviewed to see whether the case should be presented to a grand jury. One witness testified that the mixture was "hazardous" and potentially explosive; another asserted that it would burn but not explode.

Pilot Run: In what looks like a test run on pollution law enforcement in Texas, the state has brought suit against a chemical company accused of violating the anti-pollution statute, and the case has quickly moved into trial stages. At Houston, Asst. County Atty. James Cough is asking for an injunction ordering the Gulf Chemical Co. of Galena Park to "abate a nuisance injurious to the health, property and rights of the public." District Judge Phil Woodruff denied the company's motion for dismissal, rejecting the arguments that the complaint was too vague and that the company had not been given sufficient notice before the suit was filed. First witnesses for the state told about gases and fumes allegedly emanating from the plant, which produces ammonium sulfate-phosphate.

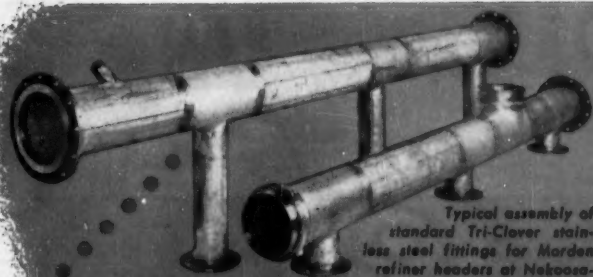
Color Combination: Allegedly illegal agreements among two U.S. and two foreign manufacturers of ultramarine blue, a widely used inorganic pigment, are the target of an antitrust suit filed by the U.S. Dept. of Justice at Huntington, W. Va. The government charges that:

- Standard Ultramarine & Color Co., Huntington, has an agreement with Britain's Reckitt & Colman and with R & C's Belgian subsidiary, S. A. des Usines Destree, setting up controls on world prices and markets and on imports into the U.S.;

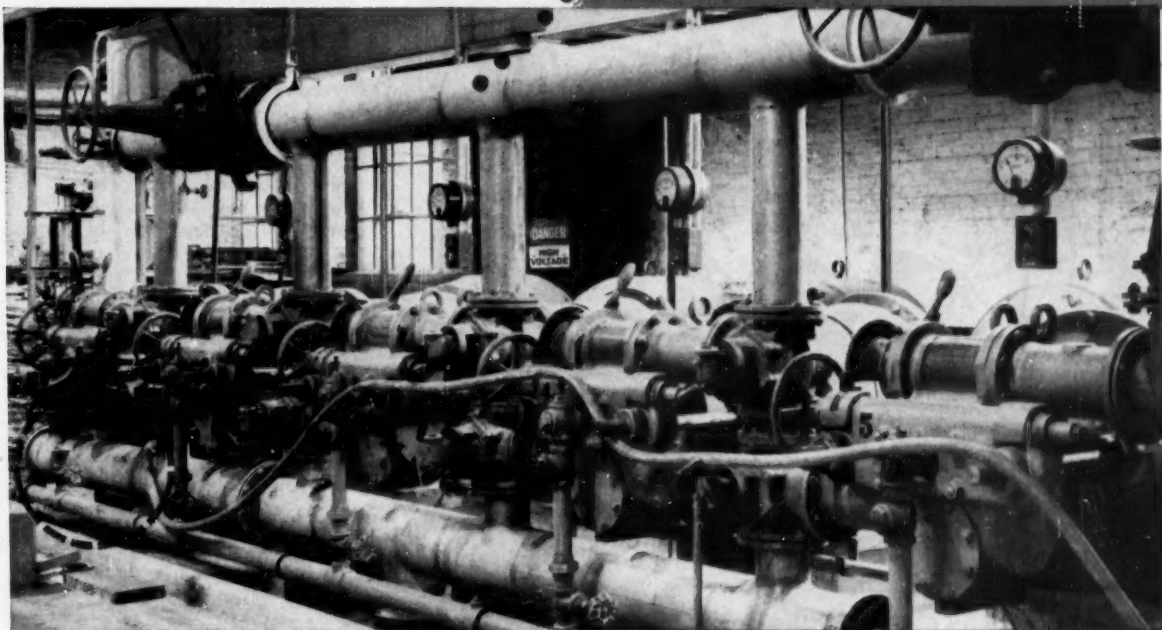
- Standard has a separate agreement with American Cyanamid's Calco Chemical Div., fixing non-competitive prices on sales of ultramarine blue and allocating sales in the U.S.

Asking an injunction against such agreements, Antitrust Chief Stanley

Save Time and Money on Corrosion-Resistant Line Assemblies . . .



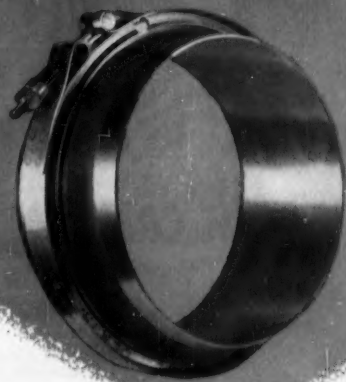
Typical assembly of standard Tri-Clover stainless steel fittings for Morden refiner headers at Nekoosa-Edwards Paper Company, Port Edwards, Wisconsin



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Among the most important factors governing the selection of corrosion-resistant fittings, piping and line assemblies are: (1) The assurance of *full* corrosion-resistance in the actual material and in the finished assemblies; (2) The assurance that the manufacturer has had ample experience and ability in producing a full range of corrosion-resistant material; and (3) assurance that actual costs for installation will be as low as possible, commensurate with the quality of the finished assemblies.

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Barnes says his aim in this suit is to permit users of ultramarine blue to buy the color at prices "set in a free and competitive market." The complaint states that Standard's gross sales in 1952 were more than \$1.5 million and that gross sales from Calco's plant in Bound Brook, N.J., were almost \$1.4 million that year.

The two foreign companies, outside U.S. jurisdiction, are named as "co-conspirators."

Payment in Sight: After 23 years, Jefferson Lake Sulphur Co. is about to receive the \$897,465 that the courts have said was owed to the company by the state of Louisiana (*CW Newsletter*, June 19). But the legislature's final action on appropriating the money to pay the judgment was marked by histrionics on the part of one state senator, who charged that Gov. Robert Kennon had been "threatening" legislators to get them to vote for the appropriation. He also asserted that bribes and intimidation in connection with the bill had been "unbelievable."

Kennon denied having threatened anyone, but said he had explained to legislative leaders that the state's supreme court, 19th district court and attorney-general all agreed that "this was a just debt," and that he felt that the legislature had a "constitutional duty" to pass the bill.

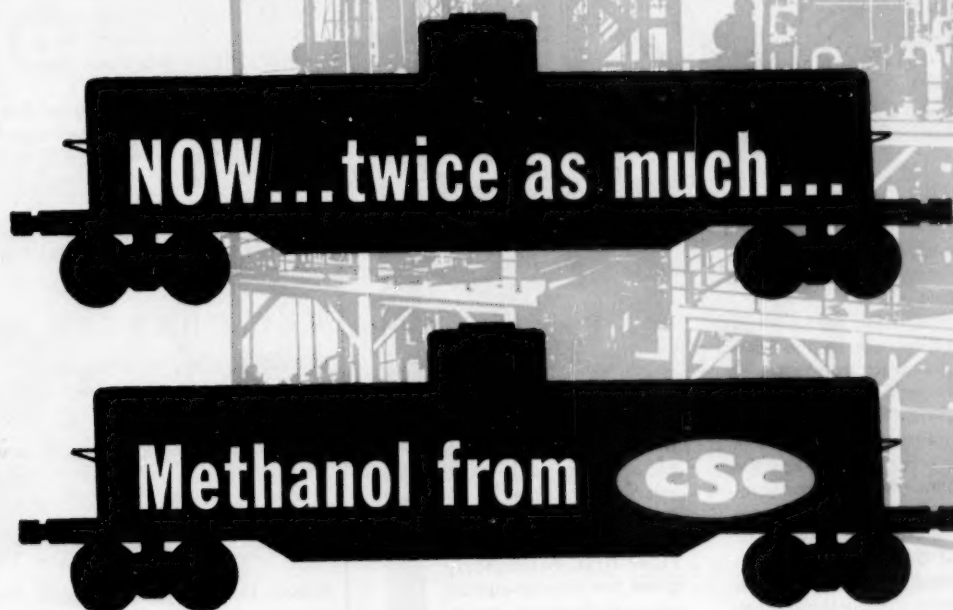
Their Place in the Sun

More numerous, more sure of their collective indispensability, and more intent on taking a larger role in national affairs—that's the word this week on the country's 500,000 engineers, about 25,000 of whom are employed in the chemical process industries.

Engineers are lauding each other on their technical achievements, but chiding themselves for not stepping beyond their own professional field into positions of broader responsibility. Among those urging engineers to aspire to a more prominent place in the sun: Frank Slutz, Dayton (Ohio) educator and counselor; and A. C. Monteith, Westinghouse vice-president for engineering and research.

At the recent Milwaukee meeting of the National Society of Professional Engineers, Slutz called on engineers to apply their traditional abilities—clear thinking, perseverance, concise evaluation of data—toward "more universal goals," such as international affairs, politics, labor relations and education.

Political Wallflowers: Monteith, who'll take office next month as president of the American Institute of Elec-



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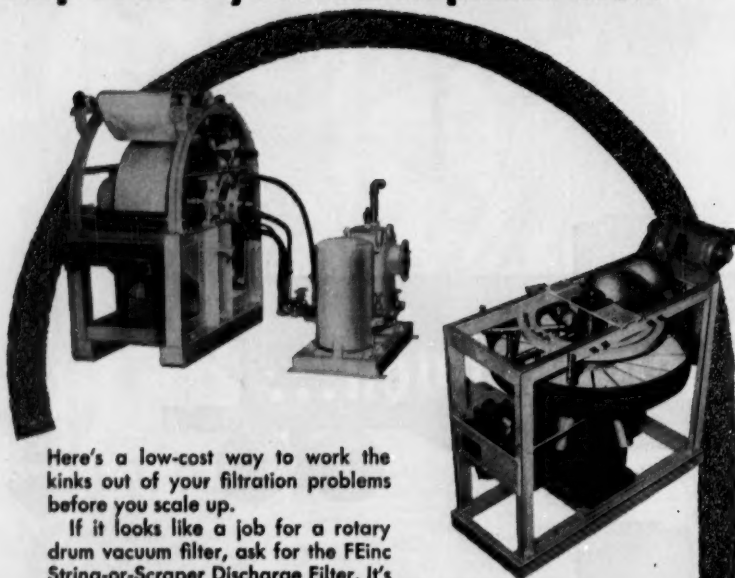
NEW YORK, N. Y.



July 17, 1954 • Chemical Week

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trical Engineers, frets that "although there are twice as many engineers as attorneys in the country, 28 of the 48 state governors are lawyers and none is an engineer." He recommends "a broad educational program . . . to acquaint government and business with the tremendous contributions engineers are capable of bringing to management and leadership."

(In this respect, the chemical industry appears to be ahead of the trend. A recent governmental survey shows that large chemical companies are using 62% more chemical engineers in administrative work than they were five years ago.)

Other topics of current concern:

- Draft deferment. Both NSPE and the American Chemical Society have suggested that the Selective Service System change its policies to exempt—not just defer—key industrial employees from military service.

- Professionalism. NSPE lashed engineers who join labor unions, but admitted that its long-range goal of "wide professionalism" is still remote.

- Gentlemen's agreements. NSPE opposes any arrangement that deprives the engineer of the right to seek a better job without jeopardizing his present position.

KEY CHANGES. . .

Harold J. Klee, to manager, Central Sales Div., Stauffer Chemical Co., Chicago.

A. T. Hanes, Jr., to vice-president in charge of sales, Sandoz Chemical Works, Inc., New York.

Milton C. Mumford, to vice-president, Lever Brothers Co., New York.

Robert D. Lowry, to technical director, Cryovac Div., Dewey and Almy Chemical Co., Cambridge, Mass.

John A. Peeples, to president, Anglo-Lautaro Nitrate Corp., New York.

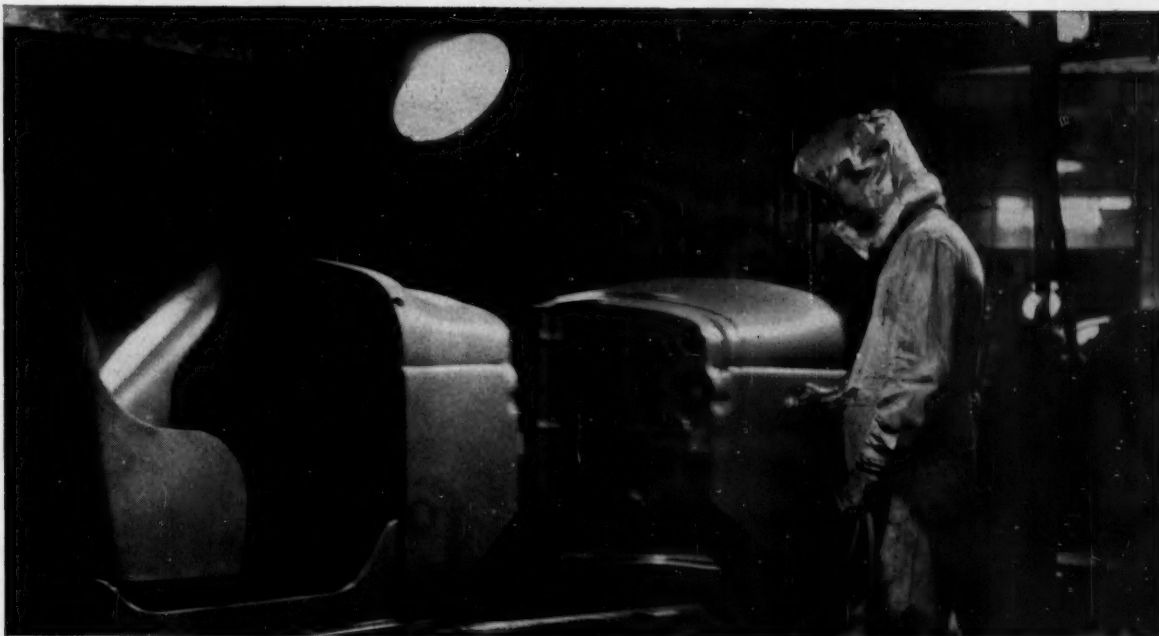
Edward J. Goett, to director, Commercial Development Dept., Atlas Powder Co., Wilmington.

David S. Weddell, to European technical representative, Monsanto Chemical Co., St. Louis.

Harry W. Brown, Jr., to president, VanPelt & Brown, Inc., Richmond, Va.

Patrick J. Dowd, to executive officer, Overseas Div., Monsanto Chemical Co., St. Louis.

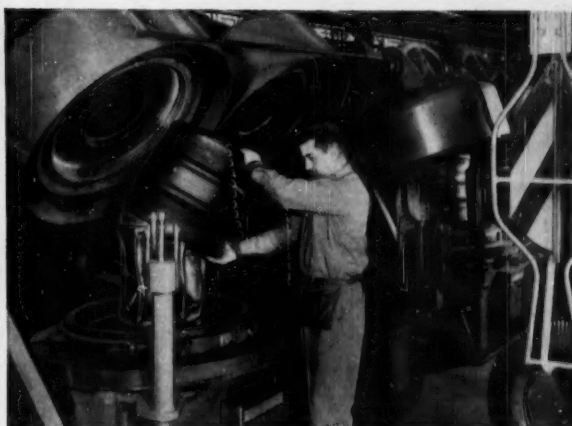
John R. Garrason, to vice-president and sales manager, E. W. Colledge, G.S.A., Inc., Jacksonville, Fla.



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Isopropyl Acetate
Acetone
Methyl Ethyl Ketone
Ethyl Ether
Isopropyl Ether
Dicyclopentadiene
Naphthenic Acids
Iso-Octyl Alcohol
Decyl Alcohol
Denatured Ethyl Alcohol

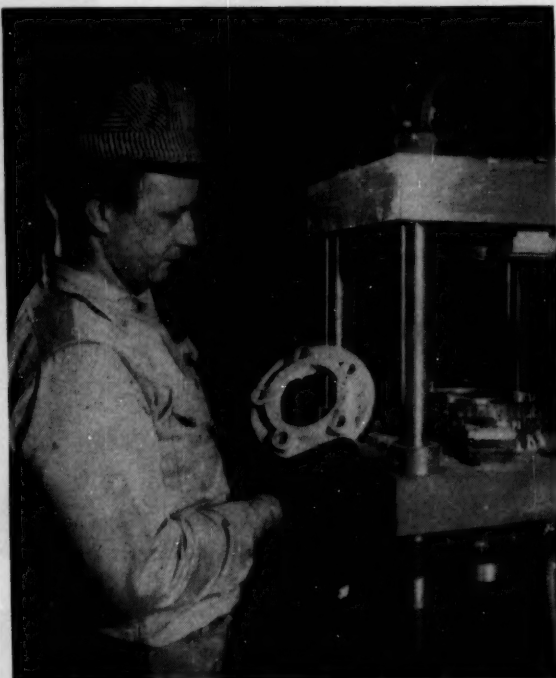
CHEMICAL

PETROHOL 91
PETROHOL 95
PETROHOL 99
JAYSOL
Iso-Octyl Alcohol
Decyl Alcohol
Denatured Ethyl Alcohol
Tridecyl Alcohol
Dicyclopentadiene
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TANKS ARE STACKED four-high to test ruggedness while operator inspects reinforced plastic flange.

Plastic Tanks Get Tough

The plastics trade, which has been vocally touting the merits of reinforced plastic storage tanks, will soon have something new to shout about: the use of epoxies instead of polyesters as the base resin. National Tank Co. (Tulsa, Okla.) now lists such a tank as a standard production item while Murdock Tank & Mfg. Co. (also of Tulsa) is readying its first one for delivery this month.

The idea of using epoxies instead of polyesters is to improve the tanks' corrosion resistance. Both National Tank and Murdock agree that the reinforced epoxy tanks will stand up to tougher applications. But they aren't in complete agreement on where the need for them lies. National Tank, for instance, said it looked into polyester-reinforced tanks for storing sour crudes, found them wanting on several counts. Murdock, on the other hand, says its regular reinforced polyester storage tanks have been handling crude oils since September 1952, and there have been no failures to date.

Nor do they agree on the cost of the new tanks as compared to steel ones. National Tank figures they'll cost about twice as much, Murdock feels they'll cost about two-and-a-half times as much as steel ones.

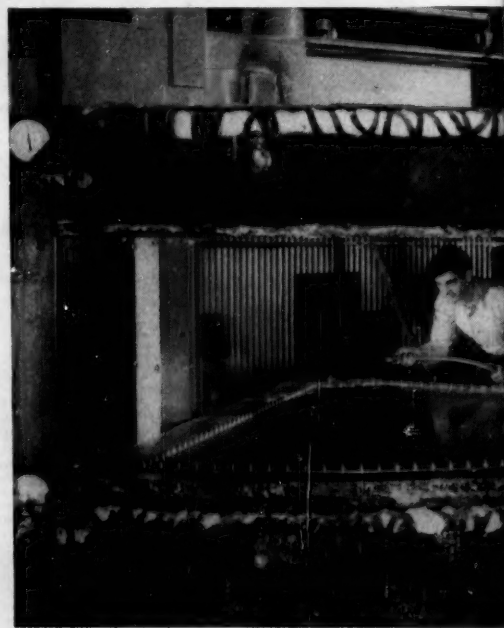
Staying in Line: National Tank is primarily a manufacturer of oil field equipment, including tanks of various types. As long ago as 1947 it started investigating crude oil storage tanks. Then, three years ago, it decided to set up a plastics division, called in Jack Gibb to head it up.

Reconciled from the start to the realization that a plastic tank would have to sell for a considerably higher price than a steel one, Gibb directed his attention to reinforced polyesters. By reinforcing the resin with a unidirectional glass mat, he was able to get sufficient tensile strength. But it dropped off considerably on exposure to warm water for even short periods of time.

His next line of attack was to try Shell's Epon resin as the basic ingredient. With an assist in the form of a curing agent developed by Shell Chemical (CL metaphenylene diamine), he was able to obtain what he considered adequate structural performance.

National's plastic tanks have been tested extensively. Gibb, in fact, reports that 20 of them have already been installed. Tagged Rezo-Glas, they're built in conformity with API specifications except:

- Instead of the 12-gage steel specified for a tank with 15½-ft. bolt circle, ⅝-in. glass-reinforced Epon resin is used. That thickness is doubled at joint lines.
- Two rows of bolts are used along



WORKER SPRAYS mold . . .

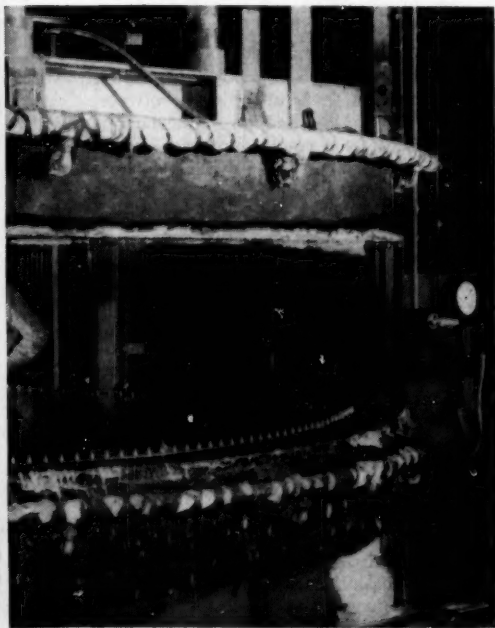
vertical stave joints rather than a single row.

• Tank bottoms and decks are made up of five sections instead of ten.

This is how it's done: Tank staves, bottoms and decks are formed in steam-heated, hydraulically operated molding presses. Three layers of continuous glass fibers are laid up in polished, chrome-plated dies, each layer being thoroughly saturated with resin. Surface fibers lie horizontally across the four-foot width of a 4x8 stave; the middle layer of fibers runs vertically across the eight-foot length. Sections are compressed to a $\frac{1}{8}$ -in. thickness at pressures close to 2,000 psi., cured at 250 F. Dome, ladder, flanges and all other accessories are similarly molded of the same material.

Costly but Durable: The net result is a tank that is at least twice as expensive as a steel one. But Gibb figures that the increased cost will be more than offset by advantages of the plastic.

He points out, for instance, that accelerated life tests indicate the plastic tanks will last many years where conventional steel tanks will not last one year. Also, the assembled, 250-bbl. tank weighs in at only 1,600 lbs.—one-third as much as a comparable steel tank. This, he feels, not only reduces shipping costs, but simplifies erection in the field, since many of the components are light enough to be handled by one man.



... with silicone mold-release agent.

Simpler with Silicon

School may be out for the summer, but industry is continuing with its studies. At the Los Angeles symposium of the American Institute of Electrical Engineers last fortnight, Westinghouse Electric Corp. (Pittsburgh, Pa.) scientists turned in papers on transistors and rectifiers, dealt with applications both actual and potential. Of more commercial significance was the unveiling of its new silicon rectifier.

As known to industry (CW, Mar. 20, p. 97), Westinghouse, along with I-T-E Circuit Breaker, Radio Corp. of America and Bell Telephone Laboratories, has been silicon-conscious for some time as it has sought a replacement for or supplement to the highly efficient but short contact-life mechanical rectifier. Any new rectifier would have to overcome the constant voltage drop of motor generators and mercury arc rectifiers, would have an efficiency close to 95%, and would have long-lived contacts—or preferably none at all—to worry about.

In search for this ideal, germanium was given some cursory study; Westinghouse even made a few prototype germanium rectifiers, and General Electric actually went on to build commercial germanium rectifier power conversion units. The G.E. units, intended as a supplement to the mechanical rectifier in the 50- to 125-v. range, operated at comparable efficiency without contacts, offered an operational life-span potentially 20 times greater than the optimum 8,000-hour contact life of mechanical rectifiers. But like all metallic rectifiers, the germanium units are temperature sensitive. When the rectifier is operated above 60 C, its reverse resistance and life span drop sharply; reverse current leakage rises fast.

On the other hand, avers Westinghouse, the new silicon rectifier will operate at 98% efficiency up to 200 C and has all the other advantages of the germanium units. The prototype Westinghouse silicon rectifier, as it now stands, delivers a 1,200-watt power output; future modifications (and possibly, combinations into power conversion units similar to those formed from individual germanium rectifiers) are expected to raise the wattage, help the silicon rectifiers find applications in computers, in aircraft, radio and television power supplies, electroplating processes, and as supplements to motor-generators.

The significance of this and similar developments, as Westinghouse semi-

conductor section manager Stephen Angello sees them, is in their applications to controls for the "automatic factory of tomorrow." Since the start of the industrial revolution 300 years ago, "we have been substituting mechanical power for muscle power," says Angello; "today, we are on the verge of developing complete 'nervous systems' for those mechanical muscles."

To the processing engineer, however, the new silicon rectifier has an equally important and more immediate significance: Safely converting alternating electrical energy into direct current, new silicon power units could widen the way to efficient, uninterrupted electrochemical operations unfettered by temperature limitations.

Triple Threat

It's a long way from Philippine cane fields to Michigan processing lines, but Layton Sugar Co. (Layton, Utah) has spanned the technological gap with a new ion-exchange process for sugar purification, has come up with an operation which it claims offers the triple assets of increased yields, higher purity and lower costs than conventional processes.

Essentially, Layton has adopted standard refining techniques, but replaced char percolation with ion exchange. The conventional decolorizing section, which occupies about half of a conventional cane sugar refining plant with its regeneration and storage areas, has been replaced with four 10-ft. (diameter) x 13½-ft. (side) cation columns holding 625 cu. ft. of resins and four 10-ft. x 11-ft. anion columns contains 412 cu. ft. of resins. The new facilities, says the firm, take far less space.

Capital costs, as well, have been slashed, avers Layton; the ion-exchange installation comes to about ¼th the cost of comparable bone char operations. The actual decolorizing costs are cut to about 2½¢/100-lb. bag (figured from the 2,500 cu. ft. of Dow MX cation and 1,700 cu. ft. Chemical Process A-2 anion resins used per thousand tons of melt/day); and, says the firm, evaporator scaling is also eliminated, thus, saving the company 500-700 lbs./year of caustic, 1,750 lbs./year of hydrochloric acid and over 8,000 man-hours/year of labor.

The operation, says Layton production manager Harold Ellison, works equally as well in full-scale production of both beet and cane sugars in granulated form.



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PERMA-LOK Fibre Drums are being used for both bulk and semi-liquid shipments. Protection from contamination is assured—an economic factor in avoiding spoilage. To meet specific requirements, special linings, coatings, and treatments are incorporated into the construction of the drum. For example, paraffin, special waxes, resins, or water-vapor barriers are used as the product may require. The exteriors may be lacquered or coated with pigmented paints for an attractive finish. Smooth, sanitary interiors give fibre drums added value.

PERMA-LOK'S exclusive "Never-Seep" crimping is a process that bonds the fibre wall and metal bottom into one integral unit. The iron-like grip protects against loss or seepage . . . protects against contamination too because dirt, dust, or foreign elements cannot work into the container. PERMA-LOK'S patented crimping process gives you maximum strength and durability. That means longer life . . . more ease in handling, no matter how much the drum is rolled from place to place.

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PRODUCTION



LAKE CHARLES REFINERY: Sulfur dioxide takes a new tack in . . .

Getting the Aromatics Out

Emerging from its successful shake-down runs this week is new capacity at Continental Oil's Lake Charles (La.) refinery. Of prime interest to chemical companies is the firm's modified sulfur dioxide process for the extraction of aromatics.

The use of sulfur dioxide in such extractions, of course, isn't a new idea. Conoco, however, has modified the process to utilize a hydrocarbon wash oil to effect high separations. By so doing, it claims a process that is unique for three reasons:

- It gives high recoveries of benzene and toluene-xylene fractions, which are extracted simultaneously.
- Only one stage of separation is required to remove sulfur dioxide from the raffinate.
- Methanol is employed in an azeotropic separation of non-aromatics from benzene.

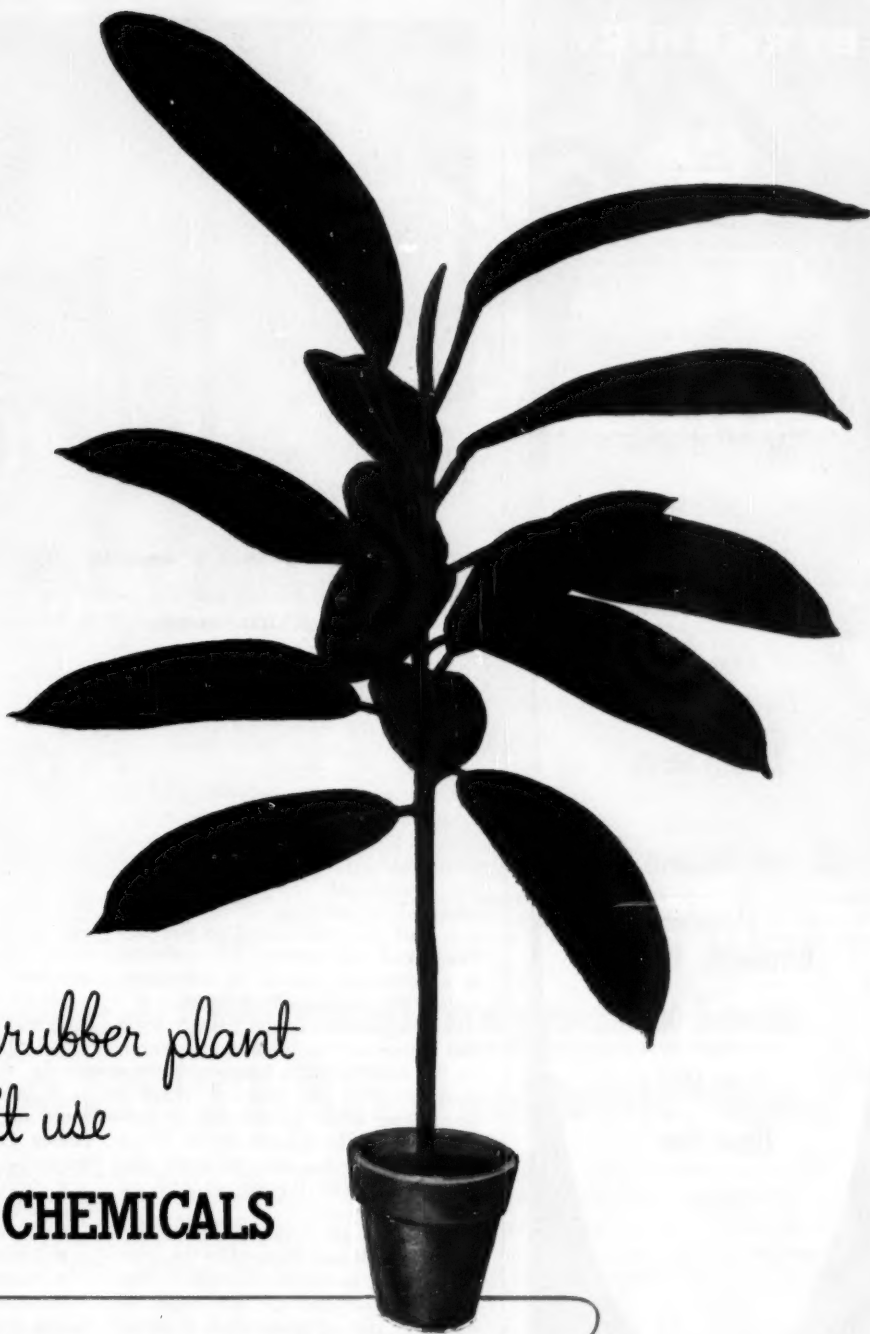
Prime contractor for the new units (with the exception of Platformer and alkyl revamp) is the Badger Process Division of Stone and Webster Corp. In the extraction section, aromatics are separated from the non-aromatics in the light reformat stream. The non-aromatics stream is used for motor gasoline; the aromatics are fractionated to yield benzene, which is shipped to Continental's Baltimore plant to make synthetic detergent alkylate. The bottoms from the distillation unit is a mixture of toluene and xylene. It could be separated into nitration-grade tol-

uene and xylene by addition of a column and treating facilities, but presently the mixture is used in blending aviation gasoline.

Simpler Distillation: The charge to the extraction unit is a depentanized, light catalytic reformat from Conoco's UOP (Universal Oil Products) Platformer. It's fed to the sulfur dioxide extraction column at a rate of 3,570 bbl./day. The column itself consists of four separate sections packed with Raschig rings. Normally, the reformat is introduced between the two middle sections, but the operation may be made more flexible by introducing it between the top—or bottom—two sections.

In any case, the sulfur dioxide, charged near the top, flows downward countercurrent to the reformat stream. The aromatics, dissolved selectively in the sulfur dioxide phase, are carried to the base of the column while the raffinate, containing some sulfur dioxide, exits through the top.

The hydrocarbon portion of the extract-solution stream runs about 75% aromatics. Normally, this would be sent to the distillation section for processing. But that's where Conoco's refinement comes in. For Conoco feeds the wash oil—a relatively heavy paraffinic hydrocarbon—to the bottom of the column beneath the packed sections. This wash oil displaces the light paraffinic and naphthenic components of the original charge from the solu-



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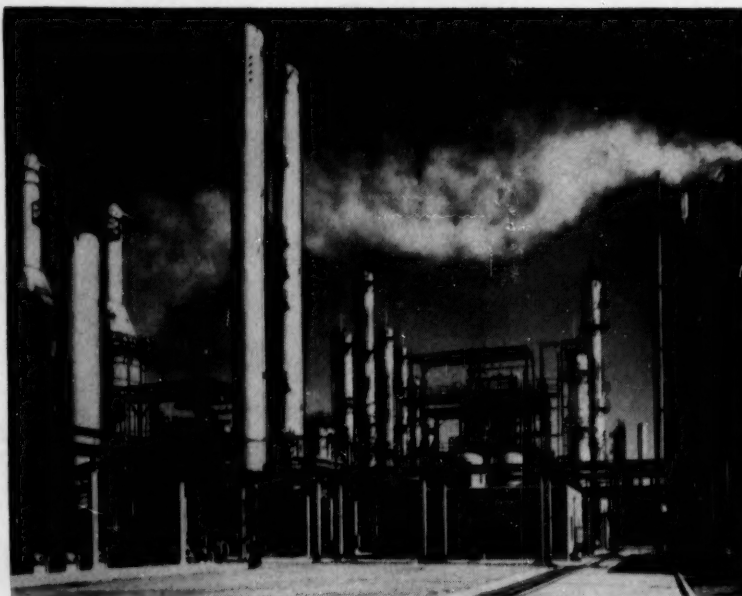
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PRODUCTION



NEW UNITS COMPLETE SHAKE-DOWN: With a wash oil, a simpler separation.

tion. And since it's a relatively high-boiling compound (in the kerosene range), it can be separated from the aromatic component by a simple distillation.

One and Two Stages: The raffinate solution overflowing the top of the column contains 275 bbl. of sulfur dioxide, 1,875 bbl. of raffinate and 2,335 bbl. of wash oil. The sulfur dioxide is removed—in one stage—from the solution and the rest is sent to the raffinate-wash oil splitter. The raffinate is a promising source of isohexane, isoheptane and paraffin solvents.

Sulfur dioxide in the extract from the bottom of the separation column, on the other hand, is removed in two stages to effect heat recovery from the condensing sulfur dioxide and to provide liquid sulfur dioxide reflux. When all the dioxide has been removed, the extract is sent to the extract-wash oil splitter.

Aromatics are taken from the top of the splitter and charged to the benzene tower, in which an impure benzene is produced as the overhead product. The toluene-xylene fraction drops out the bottom and is sent to storage.

To get rid of some of the paraffins, olefins and naphthenes in the crude benzene, it's passed through an azeotropic distillation with methanol. The finished product runs about 99% benzene but does not meet the acid wash colors for either industrial-grade or nitration-grade benzene. If it were necessary to sell the benzene for those purposes, the finished product would have to go through another treatment.

Caution on Costs: From the 3,570 bbl. daily charge to the unit, Conoco reports it's been able to recover 300 bbl. of benzene, 1,330 bbl. of the mixture of toluene and xylene. This figures to a recovery of 98.4% for the benzene, 99.7% for the mixture.

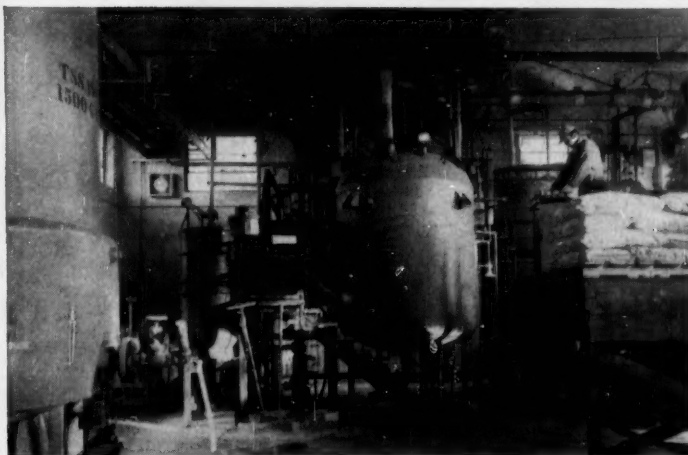
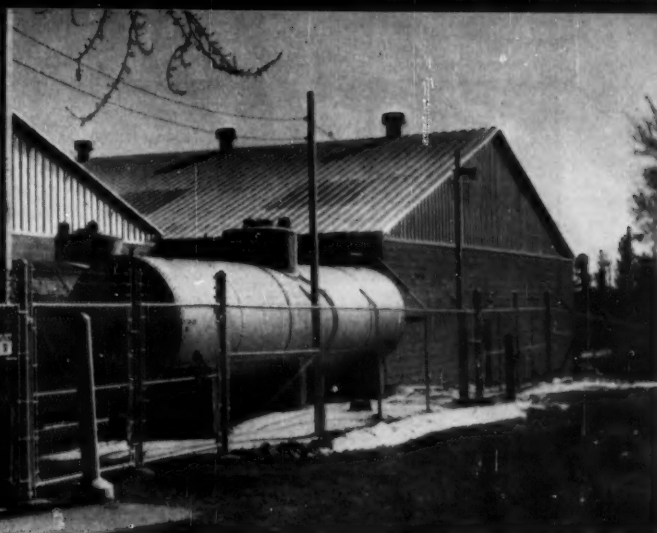
It cautions that insufficient data make exact operating costs figures impossible to determine. But on the basis of runs made so far, it feels that 25.8¢/bbl. of charge is a fairly reliable estimate. The investment in the unit amounts to \$2,660,000.

Here's how the 25.8¢ operating figure breaks down:

- Utilities: 11¢. That, in turn breaks down to 6.8¢ for fuel (at 11.2¢/million btu's); 1.1¢ for cooling water (at 0.86¢/1,000 gal.); 1.6¢ for power (at 1¢/kwh.); and 1.5¢ for steam (at 25¢/1,000 lbs.).
- Sulfur dioxide solvent: 1.7¢ (at 6.35¢/lb.).
- Chemicals: 1.5¢.
- Labor: 6.4¢.
- Maintenance: 5.2¢.

Insufficient operating history also makes it virtually impossible to assess the long-term significance of the modified sulfur dioxide extraction method. But Conoco is the first to point out the importance to the chemical industry of benzene, toluene and xylene from petroleum sources.

It cites the estimate, for example, that 30% of all the benzene produced last year came from petroleum, that by 1955, 27 refineries will be turning out 175 million gal./year. A year later, it figures, 20 refineries will be producing 200 million gal. of toluene per year,



Ample room for stills, boilers and other big chemical processing equipment is provided in rigid-frame, clear-span Butler steel building. Asbestos insulation was applied over furring strips at low cost.



Unimpeded movement of fork lift and maximum utilization of space are permitted by straight sidewalls and clear-span interior of this Butler building. Lite*Pans in roof admit flood of light during daylight hours.

Ringwood Chemical expands fast with **4 BUTLER** steel buildings

"Our rapid expansion necessitated more space—and fast," says I. K. Fuller, chief engineer, Ringwood Chemical Corp., Ringwood, Ill. "Butler steel buildings were the perfect solution. We bought our first one—for chemical processing—in 1949, and followed it with another in 1951 for the same purpose. In 1953, we bought two more—a large, heated warehouse and a 50' x 60' combined with a 70' x 80' for maintenance and warehousing.

"We were amazed at the extremely low square-foot cost—which included heat, light, insulation and automatic overhead doors. Cutting our initial building cost enabled us to buy a bigger building.

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They flood the interior with natural light, cut our electric bills, and make the buildings a pleasant place to work."

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Chicago 4	2173 McCormick Bldg.	Pittsburgh 19	3271 Alcoa Bldg.
Cleveland 15	2261 Midland Bldg.	Salt Lake City 4	573 West 17th South St.
Detroit 26	1572 Lafayette Bldg.	San Francisco 4	1571—200 Bush St.
Havana	402 Abreu Bldg.	Seattle 1	1373 Henry Bldg.
Houston 2	2169 C & I Life Bldg.	Tulsa 3	1672 Hunt Bldg.

Plants in: BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PA.

PRODUCTION

or five times the amount produced from coal tar.

Any process that squeezes more of these aromatics out is bound to affect chemical customers.

EQUIPMENT

X-Ray View: Education in the techniques of the powder camera, the x-ray diffractometer and the x-ray spectrograph is the aim of the Second Western x-ray Diffraction School to be held Aug. 30-Sept. 3 at the Sir Francis Drake Hotel in San Francisco. The school, sponsored by North American Philips Co., Inc. (Mt. Vernon, N.Y.), will accommodate area scientists who wish to attend.

• **Probe Fittings:** Photoswitch, Inc. (Cambridge, Mass.) has designed Series 67 probe fitting for use with its standard level controls. The fittings, claims Photoswitch, eliminate the need for stuffing boxes, floats, or any moving parts which could wear out or fail.

• **Centralized Control:** Bailey Meter Co. (Cleveland, O.) has brought together a number of separate pneumatic controllers and recorders, concentrated them in a single Mini-Line control station. The unit, says Bailey, provides a complete picture of control system performance and offers full flexibility of remote control. Vertical gages indicate transmitter signals, set point or bias, on hand and/or automatic control; three knobs regulate automatic-hand selection, set point or bias adjustment, and hand control.

• **Hybrid Ducting:** Flexible Tubing Corp. (Guilford, Conn.) is fabricating its Thermaflex A flexible ducting from woven glass fabric, galvanized spring steel and aluminum sheeting. The spring steel, in the form of a helix, is covered with a permanently bonded three-ply laminate of glass cloth sandwiched between two layers of aluminum sheeting. Advantages of the ducting, says the firm, are low air friction loss, high fire resistance and light weight.

• **Division Sold:** Dresser Industries, Inc., has sold its Kobe, Inc. Division of Dresser Equipment Co. (Huntington Park, Calif.) to a group of investors headed by C. J. Koberly, inventor of the Kobe hydraulic pumping process and founder of the firm. Reason: Kobe's activities were specialized and its sales and earnings represented only a small portion of Dresser's total.

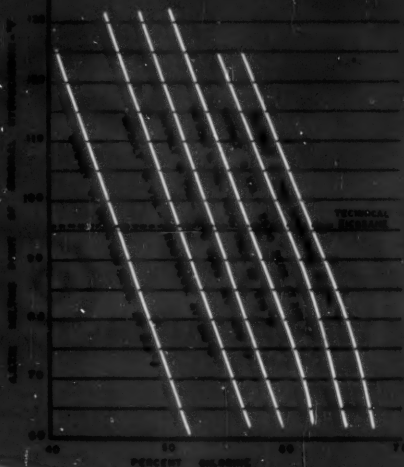
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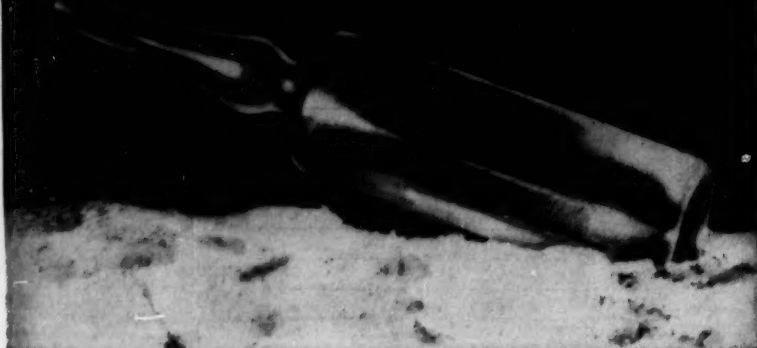
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NEW CO₂ METHOD



VASTLY IMPROVES FREEZE-DRYING OF MEDICAL PRODUCTS

Due to a new technique, CO₂ is again of primary importance in freeze-drying medical products. The new method employs CO₂, not as familiar Dry Ice, but in its liquid state. Used in this form, CO₂ offers definite advantages over both Dry Ice and mechanical refrigeration.

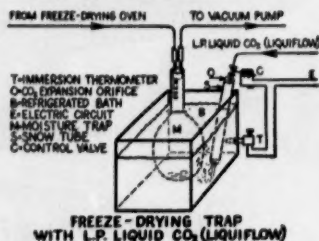
New Convenience and Efficiency

In the new process, liquid CO₂ is stored under pressure in a LIQUIFLOW* receiver. Dry Ice "snow" or liquid CO₂ is instantly available. Waste due to sublimation in storage is eliminated.

CO₂ "snow" is ideal for use in all pre-freezing operations. It is especially suitable where extremely low temperatures, -30° C. and lower, must be rapidly achieved and maintained.

CO₂ in liquid form is an extremely efficient, easily controlled refrigerant making it ideal for use in "in vacuo" water vapor removal processes. Piped from the LIQUIFLOW* receiver to condenser bath, liquid CO₂ lowers condensers to desired temperature almost instantly. Precise condenser temperatures—down to -78° C.—may be automatically achieved and maintained using liquid CO₂ in conjunction with

thermostatic controls. Storage and chopping of Dry Ice and hand charging of condensers is eliminated.



LIQUIFLOW* Freeze-Drying Advantages

No major capital investment involved. LIQUIFLOW* equipment is installed and serviced by The Liquid Carbonic Corporation. The LIQUIFLOW* system requires far less space than mechanical systems. Mechanical failure or breakdown is virtually impossible. No CO₂ loss in storage. Controlled low temperatures may be reached with extreme rapidity, simplicity and convenience.

The LIQUID CARBONIC staff of experienced technicians is always available for consultation and technical assistance in developing and modernizing freeze-drying installations.

For further information on the LIQUIFLOW* freeze-drying method Mail The Coupon Below.



* LIQUIFLOW CO₂ receiver. Unit stores liquid CO₂ at 0° F. at 300 psi. Installed and serviced by "LIQUID."

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PRODUCTION . . .

Portable Weigher: Dwight-Lloyd Inc., a division of Sintering Machinery Corp. (Netcong, N.J.) is out with a new Transportometer, a portable machine that regulates feed rate, weighs continuously.

Quiet Shaker: Vibron Div. Burgess-Sterbentz Corp. (Cleveland, O.) has added 1/4-in. and 3/4-in. noiseless pneumatic vibrators to its product line. The units, equipped with mufflers, are aimed for areas where low noise level is a major requirement, are designed to vibrate small bins, chutes, hoppers and screens up to 5,000 times per minute.

Fiber Pipe: General Foundry Co. (Holt, Ala.) has just made first delivery of its new fiber pipe. A large manufacturer of cast iron pipe, the firm decided to go into plastic pipe as well, makes the new pipe out of cellulose fibers and a preservative adhesive. The process required 15 months' laboratory and pilot-plant development, says the firm, and is still top secret.

Temperature Control: Weiller Instruments Corp. (New York) has started marketing its Resi-Twin temperature recorder and controller. Designed for temperatures to 400 C, the unit was built for vacuum distillation control, can maintain a constant temperature difference between two points of a processing still.

Shaft Seal: Crane Packing Co. (Chicago) has come forth with a new mechanical shaft seal designed to prevent leakage in modern split-case pumps. The seal is mounted on a sleeve with an outside clamping ring which permits quick installation and removal.

Hydraulic Pumps: Hydreco Div. New York Air Brake Co. (Cleveland, O.) has added a new series of heavy-duty oil hydraulic models to its pump line. The units operate at pressures to 1,500 psi, deliver up to 70 gpm at 1200 rpm. Pressure balance wear plates, claims the company, keep volumetric efficiency high at all pressures.

Plastic Blower: Industrial Plastic Fabricators, Inc. (Norwood, Mass.) has introduced its Boltaron Blowers for expelling corrosive air, fumes and gases. From the shell to the impeller blade, the blower is made of nonplasticized polyvinyl chloride whose smooth surface, says the firm, does not pick up residual matter from the gases.



Anhydrous ammonia is hauled in this Fruehauf Truck-Full Trailer operating on the West Coast. Twin-cylinder Semi-Trailers have also been designed for the rapidly-growing liquid fertilizer industry, where Fruehaufs are extensively used because of their mobility, dependability, and economy.

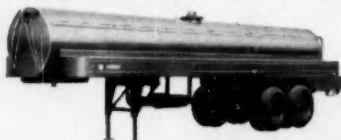
NEW TOOLS FOR INDUSTRY'S GROWTH!



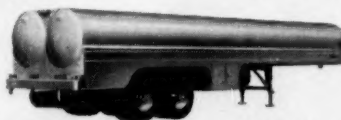
Stainless Steel Acid Transports — For nitric acid, acetate solvents, acetic acid and anhydride, aluminum sulphate, ammonium chloride, hydroxide, nitrate, phosphate and sulphate, butadine, calcium bisulphate, formaldehyde.



Carbon Steel Acid Transports — Designed to haul oleum, acids and acid sludge. When lined with the proper substance, used to carry hydrochloric (muriatic), sulphuric, and other acids.



Insulated Low-Pressure Tank-Trailers — Designed to transport hot sulphur, latex, penicillin, paraffin, hot oil, wax, tallow, resins, tar.



Twin Cylinder Tank-Trailers — Designed to haul propane, butane, anhydrous ammonia.



Insulated Hot Commodity Transports — Engineered to haul asphalt, hot oil, crude oil, road oil, tar, pitch, tallow, wax, paraffin, resin, glue.

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REPORT ON Glucuronolactone


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highly purified, crystalline forms of Glucuronic Acid, are available for your investigation and use.

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SPECIALTIES



LENTHERIC

GARDEN, BEACH: For protective creams and suntan lotions, a silicone base.

Next To The Skin

Already off the ground is a new application for silicones—for use in cosmetic and pharmaceutical preparations. Because of their non-sensitizing, non-irritating, and protective characteristics, their future in the toilet goods industry seems assured.

The two leading silicone producers, Dow Corning and General Electric, are both claiming credit for developing the new field. GE says its Tom Reilly presented the first paper on the subject at the New York convention of the Toilet Goods Assn. in December last year. Offered at that time were suggested formulas for utilizing a silicone emulsion in products ranging from brushless shaving cream to a lotion for baby's diaper rash.

More Than A Dozen: Still, it appears that Dow Corning is well up in the race. It cites more than a dozen firms now putting its brand of silicones in hand creams, lotions, and ointments. Probably best known to consumers are Lenthier's protective hand compound, On Hand, and its sun tan lotion, Nu-Tan (*see cut*). (The newest sunscreen is Bronztan, which is made by Shulton, Inc.)

It's contended that silicones can replace lanolin and oil vehicles, and that they have a future as:

- Moisture repellents for non-caking and rash-preventing skin powders, baby powders.
- Water-repellent and smear-resistant and additives in lipstick, lip salves.
- Non-rancidifying oils in hair grooming preparations, brilliantines, and home permanents.
- Stable, water-insoluble vehicles in deodorant creams, cuticle creams, and sunscreen lotions or creams.

- Bases for burn unguents, and flash-burn protectants for the armed forces.
- Extenders or diffusion-rate retarders for perfumes and colognes.

- Heat-resistant bases for specialty cosmetics and stage make-up creams.

- Water-repellent bases for hand creams, and domestic or industrial dermatological protectants.

Each Has A Pair: A few weeks ago, Dow Corning mailed out a technical bulletin on its two types. (Included was a table giving their relative compatibility with 18 common cosmetic ingredients along with the company's list of suggested formulas.) One product, 200 Fluid, is available in a wide range of viscosities. The other, 555 Fluid, is soluble in alcohol and exhibits a higher degree of compatibility with various cosmetic agents—it makes possible a high degree of water repellency in clear, cologne-like solutions.

GE has two also. Its Velvasil series is similar to the 200 Fluids, dimethylpolysiloxanes. Viscosities range from 40 to 100,000 centistokes. GE says it's "neck and neck" with Dow Corning—Velvasil sales letters were sent last week to drug and cosmetic houses accompanied by a reprint of the "first" paper. Its other product, an alcohol-soluble type, bears the number 81431, will soon get a name of its own.

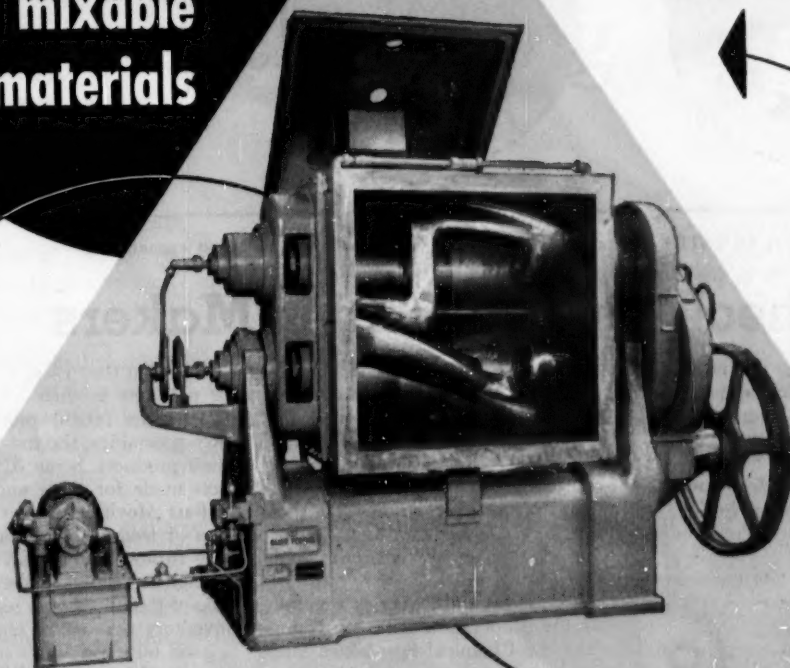
Though Linde, too, is supplying silicones for cosmetics, it has eschewed widespread promotion, preferred to work quietly with formulators.

No matter which company eventually gets the largest share of the market, it's clear that the versatile silicones are now nudging into another market—and one with a multiplicity of end products.

BAKER PERKINS

**mixers for the rapid
efficient mixing of
all mixable
materials**

**Size 16—JWIM BAKER PERKINS
Universal Vacuum Mixer with over-
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trough shell. Trough shell and cover are
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If it can be mixed, there's a BAKER PERKINS Mixer that will do the job thoroughly and efficiently. In capacities to suit your requirements, B-P Mixers can handle materials ranging in consistency from dry powders and light fluids to stiff plastic masses. Here are just a few of the products being made and the mixing and kneading operations now being successfully performed in B-P machines:

Foundry Sand

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Adhesives

Floor Tile

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Color Flushing

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Food Products

Plastisols

Blending

Paint and Varnish

Rubber Dispersions

Carbon Products

Pigment Dispersion

Chemical Reactions

Rubber Products

Dog Food

BAKER PERKINS INC.

282

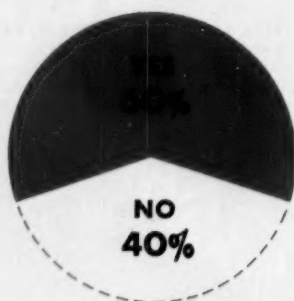
CHEMICAL MACHINERY DIVISION • SAGINAW, MICHIGAN

July 17, 1954 • Chemical Week

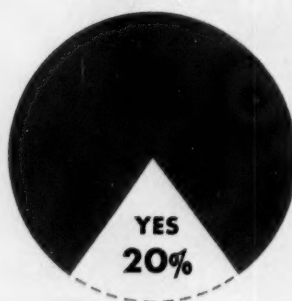
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SAMPLING SPECIALTIES MAKERS

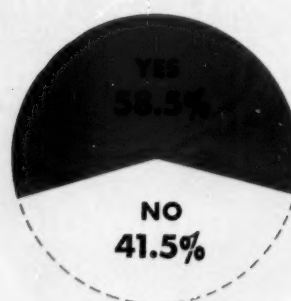
**Planning
Expansion?**



**Money for Expansion
Hard to Get?**



**Salesmen, Distributors
Hard to Find?**



THREE QUESTIONS that indicate that specialties makers find '54 an encouraging year.

Pulse Check on Specialties Makers

Optimism, indicated by an intention to expand, is one feeling apparent in Chemical Week's just completed survey of chemical specialty manufacturers. And just "asking around" has come up with plenty more on what's worrying specialties firms in '54, a year preceded by many dire predictions.

Here's some of the points uncovered in the CW study of firms from coast to coast:

- Nearly 60% of those replying to the questionnaire planned plant expansions or have just completed some. In addition, many others plan to broaden their product lines.

- Although securing money for desired expansion is a serious problem for a few firms, most experience no difficulty in doing so.

- Questioned about finding salesmen, about two-thirds of the firms reported it was a perplexing problem. (More respondents went into detail on their difficulties here than on any other question.)

- Slightly more than half the companies said they had trouble finding new products to manufacture and merchandise.

More than seeking only industry problems, CW sought to learn more about some current industry practices. A few points:

- Over 80% make periodic checks to eliminate "dead" items.

- Of firms that offer complete lines in specific categories of products, nearly 20% have "loss leader" items.

- Under half the firms (46%) have a complete turnover of inventory six or more times each year.

Sharper Focus: These data help bring into focus the rather vaguely outlined picture of present day specialties firms. Few studies on them exist; there have been few, if any, probes into company attitudes, policies, or problems.

CW survey, with queries prepared with the cooperation of H. W. Hamilton of the Chemical Specialties Manufacturers Assn., was sent to a sampling of manufacturers across the country—large firms and small, and those with interests in all phases of chemical specialty manufacture—aerosols, automobiles, sanitizers, insecticides, soaps and detergents, waxes, etc.

All respondents replied anonymously. They were pretty evenly divided among the various product classifications, and respondents were spread fairly equally among suppliers to industrial, retail, and wholesaler outlets.

Although an attempt was made to sample companies of all sizes, better than half the respondents classified themselves as having 100 or more employees; among the "less-than-100" firms, replies were evenly scattered.* About two thirds of those replying reported that sales were \$1 million or more at the manufacturers' level.

Nearly 75% of the respondents re-

* Divisions were: 100 or more, 75-100, 50-75, 25-50, 10-25, 10 or less.

ported that they carry a complete line of products in their field of interest. Most firms (60%) produce all their own specialties, the rest make some of their products. Some 31% have products made for them under contract.

Fast Moving: Replies to the question of frequency of complete inventory turnover were particularly interesting. It has long been a business rule-of-thumb that six replacements of inventory per year is characteristic of a good business. CW's survey showed that roughly one fourth have turnover at the prescribed six times a year. But with others, it varied from twice a year to 25 times a year. Some 40%, however, had a turnover four or fewer times per year.

There seems to be no particular relationship between sales volume and turnover—in the case of companies with two per year, business was \$1 million or more; the same was true of those reporting 15 or 25 turnovers per year.

Troubles: A considerable portion of CW's survey dealt with matters bothering specialties makers. Unfortunately, there is no way to compare the problems of '54 with those of past years. Here, though, are some of the current frets:

Distribution. Over 70% have difficulty in moving products to consumers in the most efficient way. This percentage is much higher than that of those who report difficulty in getting manufacturing supplies; only 35% feel that they could improve business if sup-

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Produced under rigid physical and chemical control, Federated Zinc Dust has 97.0% minimum metallic zinc content; iron content .01%, lead .20% maximum. It will all pass through a 100 mesh screen; 97.0+% through a 325 mesh screen.

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You can have a free half-pint sample of Federated Zinc Dust for testing as a reducing agent. Just write on your company letterhead. Investigate it, too, as a catalyst and as a polymerizer.

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SPECIALTIES

plies were cheaper or more readily available.

About 60% list salesmen, distributors as their problem. In some ways, it is a lower figure than one might estimate from conversations with many manufacturers. Where it is of concern at all, it is a major concern. Typical statements: "biggest problem"; "constant problem"; "securing good salesmen is a problem."

Some other comments: "The major problem is finding, hiring and training salesmen and getting them started." Another reported that salesmen aren't hard to find, but "personnel in sales are weak."

Expansion. As mentioned above, 60% of respondents plan expansion. Of those planning enlargement, 15-20% report problems of one sort or another in getting money. But of those replying to the question "have you tried factoring," only 7% have attempted this way of getting funds for expansion—largely, it seems, because of the high cost of such financing.

New Products. Finding new products is a problem to about 55% of the firms surveyed. Again, this is a seemingly low percentage; because as one company said: "isn't it everyone's problem." Related to this were some pointed remarks: that finding the sales

potential of a new product is particularly difficult, and that selling jobbers on a new product is harder than finding new items.

Undercutting: Volunteered many times were comments that "bathtub producers . . . make competitive products and offer ridiculously long discounts that most larger and established firms have difficulty in meeting."

Another put it this way: "We understand that retail selling to small users and large users of industrial cleaners in many cases a premium deal, or it's via money under the table to the janitor. Merchandise merits are almost inconsequential. The larger manufacturers are offering good, honest value for a fair price, the bucket operator [offers] a lot of talk and a very poor substitute for better known makes. Actually, it is about the most messed up industry—if you can call it such—operating today."

It is, of course, impossible to put a quantitative value on these complaints of price cuttings. That has bothered all industry for years. It is probably no worse in the chemical specialties field than in any other, probably no worse now than it was a few years ago, and might well be less, because of the efforts of CSMA and similar groups.

All in all, specialties makers in gen-

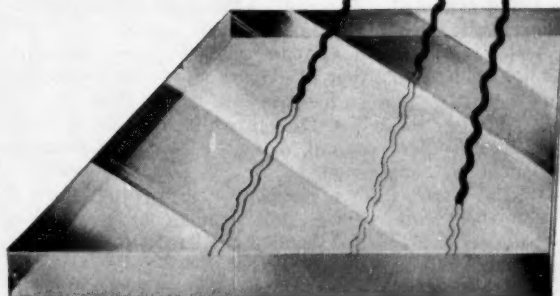


For Saving Pilots

CHLOROBROMOMETHANE put out this inferno of 150 gallons of high octane aviation gasoline and lubricating oil in England recently in just 33 seconds. The fire was a simulated crash of a Spitfire aircraft. General Fire Appliance Co.,

Ltd., which arranged the demonstration, says it took only seven gallons of its compound to accomplish the job. The firm's mobile unit, Model 240, is similar to that being supplied to U.S. Air Force bases throughout Europe.

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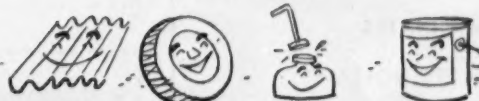


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Cyanamid, one of the first producers of fluorescent dyes and pigments which convert ultraviolet light to *visible* light, offers UV Absorber 9 which converts ultraviolet radiations to *invisible* or infra-red radiation. When used in protective coatings or incorporated directly in many plastics, it acts as an effective, transparent sun-shield—preventing discoloration or deterioration caused by ultraviolet light.

UV Absorber 9 is a stable, chemically inert, phenolic ketone which strongly absorbs ultraviolet light but is transparent to visible light. It preserves the strength, flexibility and color of plastic films from embrittlement and discoloration due to ultraviolet light.

UV Absorber 9 is effective in preventing yellowing and other deterioration of vinyl chloride, methyl methacry-



PLASTICS...RUBBER...OILS...PAINTS AND LACQUERS

late and styrene polymers. Other suggested applications include dyes and pigments, wax, soap, paper, textiles and products mentioned above. Use the attached coupon for full information.

PHYSICAL PROPERTIES

Appearance	Pale Cream Powder
Odor	None
Molecular Weight	228
Melting Point	63—64.5°C
Specific Gravity	1.324
Solubility:	Soluble in a number of common organic solvents and resin plasticizers, but insoluble in water. Compatible with vinyl, acrylic, styrene, and cellulose plastics.
Temperature Stability:	Can be heated to 200°C (492°F) for 1 hour with no change in its melting point or ultraviolet absorbing capacity.

*Two additional UV Absorbers, 1 and 12, still in the development stage, are now available in research sample quantities.

SAMPLE AND TECHNICAL DATA

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New Product Development Department, Section A
30 Rockefeller Plaza, New York 20, New York

Gentlemen:

Please send:

UV Absorber 9
UV Absorber 1
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Sample

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SPECIALTIES

eral are pretty pleased with matters in '54. It's to be hoped that next year's survey will mirror views that are just as encouraging.

Two-A-Day: An interior wall sealer which permits two-coat work on the same day is currently being marketed by The Arco Co. (Cleveland). Arcotone P.V.A. Interior Sealer is formulated for use on masonry, wood and wallboard surfaces.

Maskers: Dodge & Olcott, Inc. (New York) now sells a group of masking odors for fuel oil as well as a series to cover the off-odor of phenolic preparations used in the process of sterilizing boxes and cartons manufactured for cakes and other baked goods.

Neoprene Seat Covers: Du Pont reports that seat covers which resist water are now being woven from fabrics of neoprene-treated yarn by Swift

Manufacturing Co. (Columbus, Ga.). Name: Colorprene.

Prescription Survey: A 5,000-prescription survey completed recently by Oregon State College revealed that drugs in tablets made up 48% of all prescriptions filled by Oregon pharmacists in 1953. Also noted:

- Average cost to have a prescription filled was \$2.48—this represents an increase of 15¢ over 1952.

- Druggists didn't have to compound, or mix, 91% of the prescriptions.

- Hormone type of drugs showed the greatest purchase increase, sulfas and vitamins the largest decreases.

Color Note: Color TV—or at least colored TV cabinets—is possible with new tinted urea plastic developed by the Barrett Div. Allied Chemical & Dye Corp. and Chicago Molded Products Corp. Motorola, Inc. will



Monkeys Take Over

EXIT horses, enter monkeys. That's the case with the 700-acre Parkedale farm of Parke, Davis & Company near Rochester, Mich. At one time it stabled over 1,000 horses which were used to supply antitoxins and serums. Now that the development of sulfas, penicillin and such has greatly reduced the need for such injectables, horses are on the wane. Now the company plans to expand its output of polio vaccine by remodeling one of the above buildings and by adding another for rhesus monkeys. (It's expected both buildings will be in operation by Oct. 1.) Polio virus is test-tube grown in monkey tissue.



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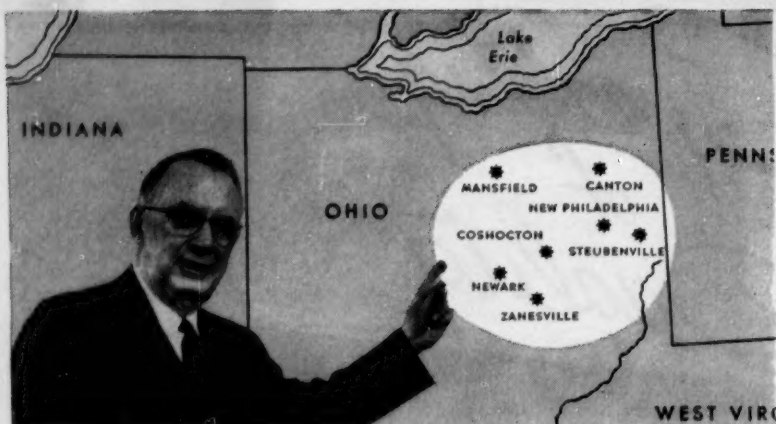
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COMPANY _____

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CW



H. Horton Hampton, Vice President, Industrial Development, Nickel Plate Road.

This area has plenty of Timber-Coal-Water

When investigating locations for manufacturing plants, consider the Muskingum Watershed Conservancy District. Covering all or part of 18 counties in southeastern Ohio, the area has a fine labor supply, is convenient to major markets and has a unique combination of resources.

Timber—The forest area of 1,100,000 acres has a net sawtimber volume of 2,875,000,000 board feet and a net annual growth of 145 million board feet.

Coal—High grade steam coal underlies practically the entire District.

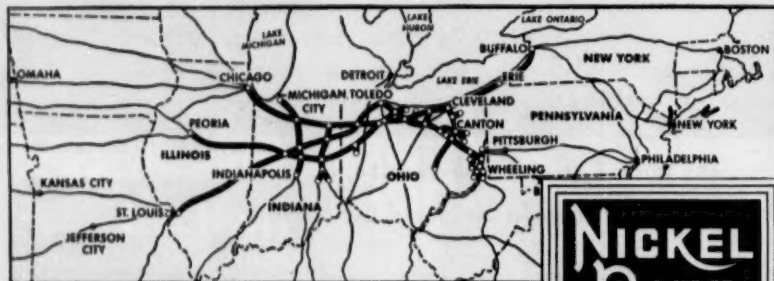
Water—An assured water supply comes from the Muskingum River, its watershed and tributaries, covering 8,038 square miles and controlled by 14 dams and 10 lakes.



The plentiful timber supply includes oak, maple, beech, poplar and ash. Rail and highway network is excellent.



The lakes and dams in the area provide excellent recreational facilities as well as industrial water sources.



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SPECIALTIES

sell units in the colored cabinets.

Double Job: Fattening cattle and preventing veldt fires at the same time is the aim of a novel South African agricultural technique. Farmers there spray the tough, dead winter grass with a mixture of urea, molasses, and water. The spray makes the grass extra palatable, boosts its food value (the urea is converted to protein by the stomach bacteria). In addition, the mixture reduces chances of brush fires sweeping the pastures.

Upping Suds Level: Armour and Company's Industrial Soap Dept. has added another item to its liquid non-ionic synthetic detergents, Energetic W-100. Water-white, nearly odorless, it's said to have instantaneous wetting ability, good detergency and to produce a high level of suds.

Washing Without Water: The Milburn Co. (Detroit) has introduced Ply Waterless Hand Cleaner which it describes as non-alkaline (bordering on the acidic side with a pH 6.0-6.5 close to that of average skin.) Workers like it, the firm claims, because it's harmless to gloves made of rubber and fabric.

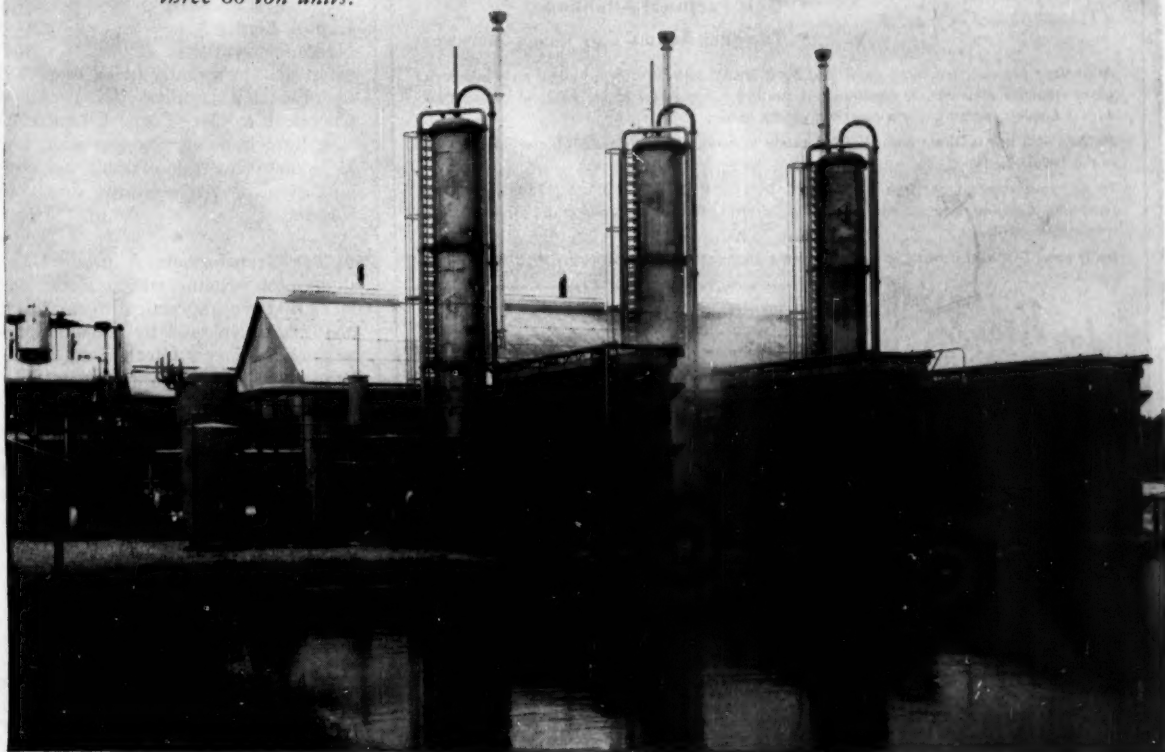
Safety Seal: A vinyl acetate copolymer, tradenamed Enva-Lok, has been developed by National Adhesives, Div. National Starch Products Inc., to replace dextrin-type remoistening gums that are standard in envelope manufacture. It's said to serve as a safety seal on all types of envelope stock, including the difficult rag bonds and krafts.

Fugitive Tints: Charlotte Chemical Labs, Inc. (Charlotte, N. C.) will soon manufacture and sell a new line of tinting colors, called Rinsefree, for natural and synthetic fibers. The firm says the tints are "more generally fugitive, even after steaming" than most now available. They come in concentrated water solutions.

Reclaiming Agent: Ram Chemicals (Gardena, Calif.) sells a product it says permits the reclaiming and salvaging of electronic components from reject units encased with epoxy or polyester resins. The job is accomplished, according to the company, by simply immersing the embedded item in compound De-Solv 292. It's said to be a non-inflammable neutral combination of low toxicity.

Silicone Rubber Polymer: Dow Corning Corp. recently released one of its

*Built for Commercial Solvents Corporation, this C & I
Ammonia Oxidation Plant
has a battery of
three 60 ton units.*



What's new in nitric acid?

Here's one of the latest additions to an already impressive string of nitric acid plants designed and constructed by C & I. It's Commercial Solvents' new 180-ton-per-day installation at Sterlington, La. Nitric acid will be used to make solid ammonium nitrate by C.S.C.'s single step Stengel process.

In recent years, 90% of America's nitric acid plants have been designed, engineered and erected by C & I. Due to vast experience in this field, C & I is able to deliver these plants at a fixed cost on a fixed date with performance and production guaranteed. C & I is also prepared to furnish the newest type Ammonium Nitrate Solutions and Solids Plants and Complex Fertilizer Plants on this same basis.

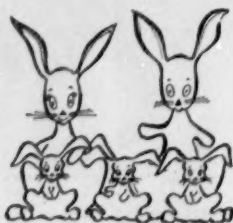
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SPECIALTIES

basic silicone rubber polymers which it calls Dow Corning 400 Gum. A dimethyl silicone gum of high molecular weight and high viscosity, it's said to be nontoxic, easy to handle with conventional compounding equipment, stable in storage.

Liquid Form: A new liquid form of Nacconol synthetic detergent, Nacconol SL, is currently being marketed by National Aniline Div., Allied Chemical & Dye Corp. Characteristics: light in color, pleasant odor, low hazepoint, low salt content, no precipitation at temperatures down to freezing.

Primer Transformer: A product designed for priming rusted metal surfaces that are impractical to sandblast has been developed by Emjay Maintenance Engineers (Rutherford, N. J.) When applied on rusted areas, KIP 100 converts the oxide film into absorbent, inert and stable phosphates, the maker asserts. It's said to be superior to wirebrushing, and to inhibit further rust formation after paint has been applied.

Mist for Martinis: For the lazy bartender who likes the lemon peel flavor in his martinis, but doesn't like to pare lemons, polyethylene squeeze bottles solve the problem. Jock Colling Co. (Danville, Ill.) is now selling a squeeze bottle atomizer filled with lemon rind oil. A squirt of the oil (\$1.50/bottle holds enough for 4-500 glasses) mists the cocktail glass with the flavoring.

Photogenic Ducts: Cholografin, a new Squibb & Sons product, has been developed to make possible X-ray visualization of bile ducts. The compound is a water solution of a crystalline substance that is excreted preferentially by the liver. Injected intravenously, it is excreted rapidly enough to give a high degree of visibility under X rays.

More Lather: Colgate-Palmolive is introducing a running mate to its aerosol-packed Rapid Shave lather. New product is Barber Shave, packed in a 6-oz. Crown can lithographed in red and white barber stripes. Barber Shave is being nationally sold, at 69¢ per can.

Drain Cleaner: Abbey Chemical Co. (Chicago) is now selling Sept-O-Solve, a concentrated mixture of enzymes to liquefy solids in septic tanks, cesspools, etc. A one-lb. container retails for \$1.79, three for \$5.



How "Dutch Boy" Chemicals help the paint industry make good products better

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Not only that! But with *Bentone* 34, the paint industry has improved the workability and durability of a wide range of pigmented products including interior and exterior paints . . . stains, varnishes and primers.

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Or if you want to look into National Lead's newest developments in vinyl stabilizers . . . in new plasticizers giving a unique combination of low volatility and low temperature flexibility . . . in special chemicals like lead hyposulphite and chromic phosphate . . . just fill out the coupon. And mail it to us, attached to your letterhead.

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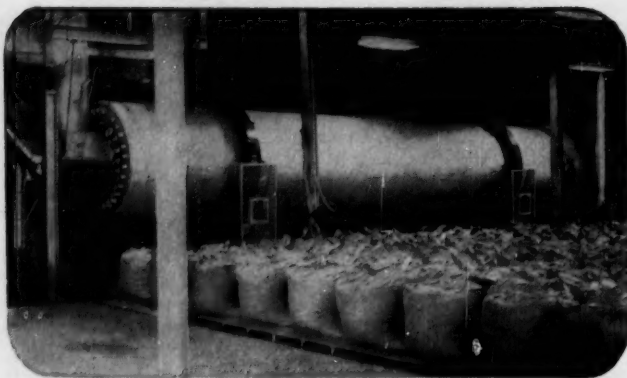
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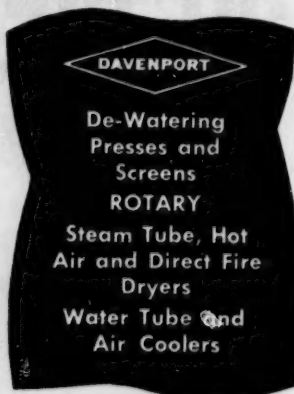
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Write for our catalog or, for quick reference, see your 1953 or '54 Chemical Engineering Catalog.

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SPECIALTIES

Space Buyer: Ayerst Labs., div. American Home Products Corp., has acquired a 7,500-sq.-ft. building in Chicago. Ayerst makes pharmaceuticals.

Rub Resistant: A new technique for treating paper to increase its wet strength and abrasion resistance has been developed by Dewey and Almy's Shoe Products div. By impregnating paper with various formulations of synthetic elastomers and resins, paper that retains 90% of its tensile strength and "more than 10 times the abrasion resistance of paper treated by ordinary methods" is produced.

Easier Cutting: S. C. Johnson & Son, Inc., is set to market a new water soluble cutting fluid for use in machining all kinds of metal. The fluid, tabbed TL-131, is mixed with water (40 parts water to one TL-131).

Pre-phosphating Cleaner: A new cleaner designed to prepare metal for phosphatizing has been worked out by Detrex Corp. (Detroit). The new cleaner, Detrex 771 Paintbond, is said to give a surface ideally suited for fine-grained phosphate crystal coatings.



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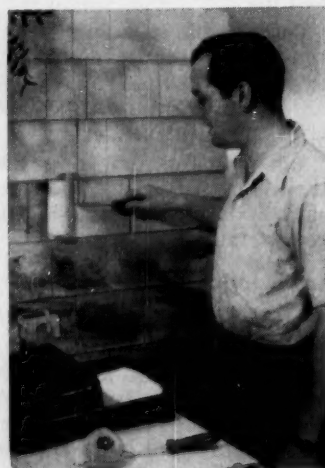
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Switch To Synthetic

JUST as home-painters are taking to "rolling-their-own," so some major paint companies are switching to Dynel to manufacture their rollers. That's the report from Carbide and Carbon Chemicals Co., maker of the synthetic fiber. Claims for it: "remarkably" resistant to moisture, oil paint solvents and acids, moth and mildewproof.



Dependable Source for Chemical Raw Materials



J. Riccardi, President, Roman Cleanser Co., Detroit, Michigan.

"Wyandotte Caustic is particularly well suited to making a better bleach"

—J. Riccardi, President, Roman Cleanser Co.

"There is no secret in making a bleach that is stable, effective, and easy on the clothes and hands," states J. Riccardi, President, Roman Cleanser Company, Detroit, Michigan, a pioneer maker of household bleaches. "It starts with a pure Caustic which must not be contaminated with iron, and requires proper equipment and careful handling right through to the consumer.

"Wyandotte Caustic is particularly well suited to making a better bleach," states Mr. Riccardi whose experience dates back to 1919. "It's never over 3 or 4 parts per million iron. Once it gets to our plant, we see that nothing but pure rubber, plastic, or glass ever comes in contact with it.

"From our experience, we know that our Caustic from Wyandotte will always meet our requirements. The same holds true for the Chlorine we purchase from them. We know, too, that should we ever run into any difficulties, Wyandotte technical service is always as close as our telephone, ready to help us out. With this combination, our customers are always assured of getting the finest bleach money can buy."

Are you working with a supplier that controls quality with your products in mind? Are you getting the kind of technical assistance that is both prompt and practical? Wyandotte offers you quality-

controlled chemical raw materials, and helpful technical assistance in putting them to work advantageously for you. May we serve you? *Wyandotte Chemicals Corporation, Wyandotte, Michigan. Offices in principal cities.*



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Calcium Carbonate • Calcium Chloride • Glycols • Synthetic
Detergents • Agricultural Insecticides • Soil Conditioners
Other Organic and Inorganic Chemicals

How Polyurethanes are Made and Put to Work

- 1 Diisocyanates
produced by the reaction of phosgene and diamines, react with . . .
- 2 Polyesters
or other materials containing at least two active hydrogens, to form . . .
- 3 Addition polymers
which may be represented this way: $\text{OCN} \dots \text{R-NHCOO-R'-OOC-R''-COOCONH-R} \dots \text{NCO}$
- 4 Tough Rubbers
are made by vulcanizing, or joining the end—NCO groups of different chains.
- 5 Foamed Plastics
are produced by treating the resin with water to liberate carbon dioxide.
- 6 Adhesives, films, fibers, protective coatings and a raft of other potentially profitable commercial materials are products emerging from today's widespread research with polurethanes.

Isocyanate Probers Step Up the Pace

The short history of isocyanates in the U.S. chemical industry is tied most closely to two names: Du Pont and Monsanto. Both, this week, are in the spotlight: Du Pont, for its new Adiprene B urethane rubber, now undergoing field tests; Monsanto, for a string of new isocyanate and diisocyanate process patents.

Ultimate importance of these developments cannot be predicted with accuracy. But they're significant now as tangible evidence of the intensive, broad-scale research effort being brought to bear on the isocyanates.

On the application side, polyurethanes formed by the reaction of diisocyanates with compounds containing two active-hydrogen groups, are taking the full force of this attack.

Aside from the fact that it is a polyurethane, not much is known about Adiprene B, and Du Pont at this point isn't shedding very much light on the subject. But the facts concerning Goodyear's Chemigum SL and the earlier German Vulcollan pretty much state the general case for polyurethane rubbers.

Essentially they're glycol-adipic polyesters hooked up with diisocyanates. The latter serve principally as chain lengtheners, do double duty as stations for cross-linking with the aid of water, glycols, diamines, or amino alcohols. Cross-linking, or curing, may also be accomplished by the further addition of diisocyanate.

Recent U.S. patents (2,620,516 and

2,621,166) assigned to Farbenfabriken Bayer, A.G., indicate that the curing (cross-linking) time of these rubbers may be varied considerably by the selection of diisocyanate and reagent. Among the former, Goodyear has been most interested in derivatives of benzidine, naphthalene, toluene and diamines. Moreover, research by Imperial Chemical Industries has shown formaldehyde, nitro compounds, benzoyl peroxide, quinone oximes, chromates, and dichromates to be effective in varying degrees as additional polyurethane curing agents.

Polyurethane rubbers, as a group, feature high resistance to abrasion, oil, ozone and aging. In addition, tensile strength and load-bearing capacity are reported to be markedly superior to the best CR-S polymers.

Processing, on the other hand, is difficult, owing to the rapidity with which the finished polymer mass becomes vulcanized. Both Bayer and Goodyear have come up with methods of retarding vulcanization. The latter's, specified in U.S. patents 2,625,531-2-5, appears to have definite advantages, gives a better-quality product.

All this is in keeping with Du Pont claims for Adiprene B, which include "high tensile strength as well as resistance to oxygen and degradation." It also jibes with the admission that at present the new elastomer is difficult to process.

What, if anything, the new Adiprene B has to offer remains to be seen. As the first potential domestic competitor for Goodyear's Chemigum SL, however, it cannot fail to quicken the pace of studies closing on a spate of still unsolved polyurethane rubber problems. Of these, adhesion to other types of rubber is perhaps most serious as an obstacle to tire utilization.

Although elastomers seem to offer the greatest long-term commercial opportunity for isocyanates, they are keenly rivaled by plastics for research attention.

Future for Resins: Some of the earliest studies in the field of polyurethane resins were concerned with fiber-forming materials, films and protective coatings. Efforts in this direction by Du Pont chemists paid off in 1942 with the granting of a string of important patents on isocyanate-based resins.

Among the earliest patents in this field they include: 2,282,827; 2,284,637; 2,284,895-6.

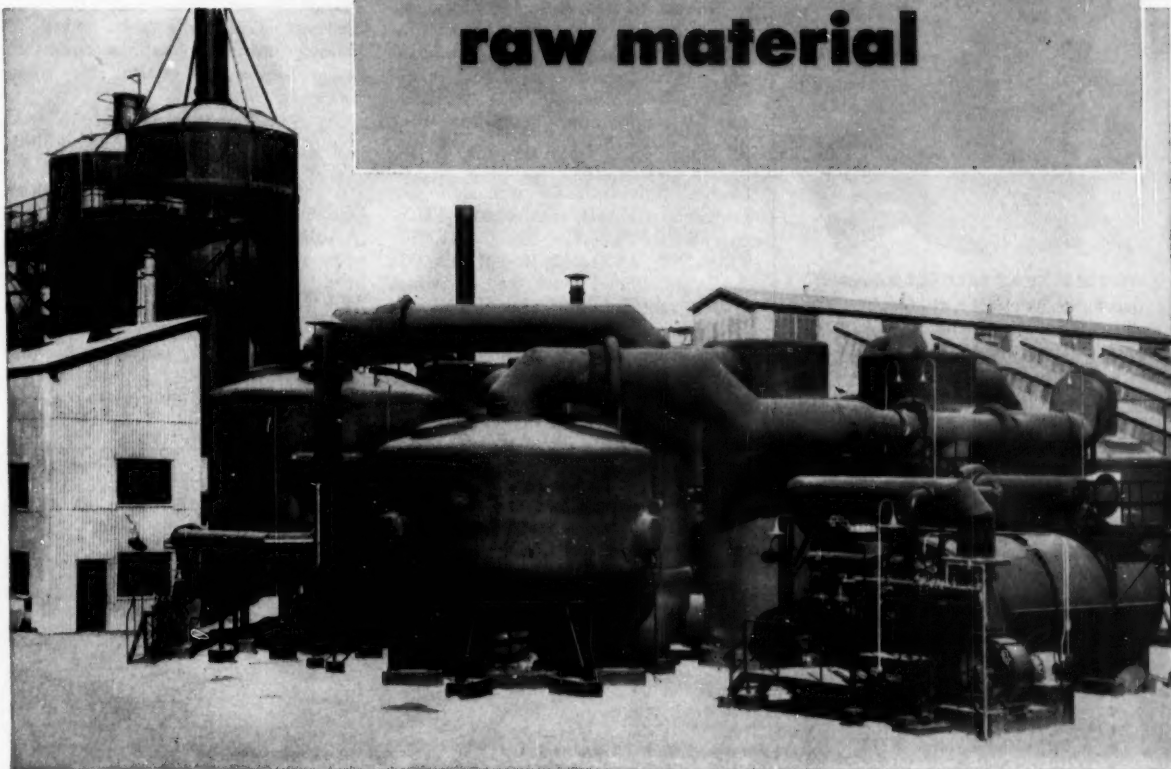
Currently creating the most stir are foamed materials that are finding heavy use in the aircraft industry, some favor in electronics and toy manufacture.

Underlying the production of these foamed resins is the reaction by which the addition of water causes the polyester-diisocyanate reaction product to give off carbon dioxide. By careful control of reaction conditions and molecular weight of the poly-

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RESEARCH

ester, foams possessing a wide range of physical properties may be produced.

Recent developments have centered around phenol-aldehyde diisocyanate modified resins and the use of polyester mixtures in the preparation of foamed polyurethanes. U.S. patents 2,642,403 (Lockheed Aircraft) and 2,608,536 (Westinghouse), deal, respectively, with these innovations.

Taking its lead from the Germans, Monsanto has come up with an aluminum-filled polyurethane foam. Also on record are polyurethane foams stabilized with metal soaps and quaternary ammonium bentonite complexes.

Much of the pioneering research in foamed polyurethanes was done by Lockheed Aircraft, is covered by U.S. patents 2,577,279-80-81; 2,591,884; 2,602,783; 2,634,244; and 2,642,403. Today Lockheed (with its Lockfoam) and Armour (with Armofoam) are preeminent in the field. But potential competition in the shape of newly formed Mobay Chemical Co. (CW, May 1, p. 26) looms large. A union of Monsanto and Bayer, Mobay will

produce isocyanates and polyesters in a proposed plant, the location of which has not yet been selected.

Coating Hurdles: Additional applications for polyurethane resins in protective coatings are promising on the strength of their excellent adhesion to metals and high resistance to solvents, oils, aging, weather and laceration. But isocyanate handling hazards and a reluctance to deal with a two-component system has worked against wider acceptance of such coatings. German efforts aimed at making urethane coatings easier to use are reportedly meeting with some success.

In addition, isocyanate-derived coatings have, at one time or another, received attention from American Cyanamid, Du Pont, Hercules, Imperial Chemical Industries, and Monsanto.

Adhesives, of course, have given isocyanate producers some of their brightest hopes for expansive outlets. And diphenylmethane diisocyanate (MDI) and triphenylmethane triisocyanate have partly fulfilled these expectations. Both have gained acceptance in bonding rubber to rayon and nylon tire fabric.



Turning Over the Title

OCCASION FOR THE meeting pictured above was the signing over to the University of Houston of a 160-acre tract of land by Mathieson Chemical's agricultural chemicals division (CW *Newsletter*, July 3). Purpose of the gift (a nominal rent of \$1 per year will be charged) is to provide a place for training agriculture students, developing scientific farming meth-

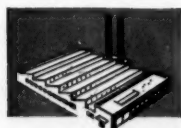
ods for the Southwest. Pictured are (left to right) Vernon Frost, former president of Houston Farm and Ranch Club (which secured the tract for the university); C. F. McElhinney, acting president of the university; and S. L. Nevins, president of Mathieson's agricultural chemicals division. The tract is located in Pasadena, Texas, adjacent to a Mathieson fertilizer plant.

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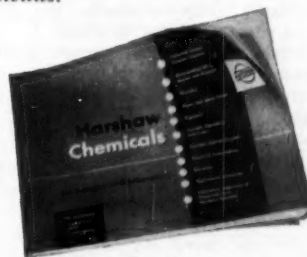


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RESEARCH

But—because of two-component systems and short storage life after mixing— isocyanate-based adhesives have not completely lived up to their German rave notices. Thus far, however, no one has found fault with their ability to form strong bonds between a great variety of materials; and with the development of better handling methods their fortunes may well look up.

Another gambit of isocyanate researchers is synthetic fibers. First attempts at fiber formation hinged on the reaction of 1,4-butyleneglycol and 1,6-hexamethylene diisocyanate to yield a hard-to-spin, hard-to-dye nylon relative. More recent efforts (detailed in British patents 683,504 and 685,729) in this field by Celanese researchers by-pass isocyanates, arrive at polyurethane fiber candidates by the reaction of diamines and bis(chloroformates).

Matter of Economics: There's no underestimating the technological problems on the road to many potentially rewarding isocyanate applications. But cost is unquestionably the chief obstacle. Isocyanates sell for between \$2 and \$4/lb. The importance of cost reduction is brought home by the fact that Chemigum SL (perhaps the biggest single long-term isocyanate outlet) could be dropped from \$1.06/lb. to 61¢/lb. if its diisocyanate component (figured at \$4/lb) declined to a reasonable \$1/lb. Proportional cuts would hold in the case of less costly diisocyanates.

At this level, moreover, a bevy of added possible uses—e.g., in leather tanning, drying oil modification, and the synthesis of textile and leather waterproofers, etc.—would be drawn into the area of commercial attractiveness.

About a dozen isocyanates are available today. Monsanto supplies phenyl, octadecyl, α -naphthyl and ethyl isocyanates; tolylene and diphenylmethane diisocyanates; triphenylmethane triisocyanate; and the closely related dimethylcarbamyl and diethylcarbamyl chlorides.

Du Pont makes tolylene and diphenylmethane diisocyanate on a commercial basis, offers others, including hexamethylene diisocyanate in lesser quantities. Hooker Electrochemical at one time made phenyl isocyanate, an intermediate in the production of isopropyl N-phenyl carbamate herbicide (offered by Columbia-Southern, U.S. Industrial Chemicals, etc.). Hooker today makes no isocyanates.

Manufacture of these compounds follow the general procedure pio-

neered at the I. G. Farbenindustrie Leverkusen plant prior to and during World War II. Very simply, the reaction entails the combination of phosgene and an amine, with the evolution of hydrogen chloride. The isocyanate corresponding to the starting amine is obtained. Back in the late '40s, Monsanto set the reaction up in two pilot plants—one for a liquid-phase process utilizing a solvent (e.g., o-dichlorobenzene); the other for a solventless vapor-phase reaction.

Results of this process development work are now coming to light in a series of new U.S. patents (2,680,127-28-29-30) assigned to Monsanto. They reveal no drastic departure from the traditional method, but there has been plenty of streamlining.

Now It's Continuous: Patent 2,680,127 blueprints a continuous process for making mono-, di-, and polyisocyanates by the reaction of phosgene and an amine dissolved in an inert organic solvent. Patents, 2,680,128-29-30 deal with the addition of a plasticizer to the reaction solution, specify reaction temperatures and solvent characteristics.

An earlier related patent (2,640,068) assigned to American Cyanamid details the preparation of a hydrocarbon monoisocyanate by the reaction (between -40 and 10 C) of phosgene and the corresponding primary amine, subsequent dehydrochlorination of the resulting carbamyl chloride.

But the phosgene route is by no means the only approach to isocyanates. Last year, Rohm and Haas was assigned a patent (2,640,846) on the preparation of alkyl isocyanates by the dehydrochlorination of substituted N-chloroformamides. And very recently Aerojet-General Corp. (Cincinnati, O.) was assigned patent 2,680,131 covering the production of trans-vinylene diisocyanate by the decomposition of fumaryl diazide.

Right now, any process that could turn out isocyanates at \$1/lb. for current production levels would have no trouble finding a taker—regardless of the method it employs in bringing its versatile product to market.

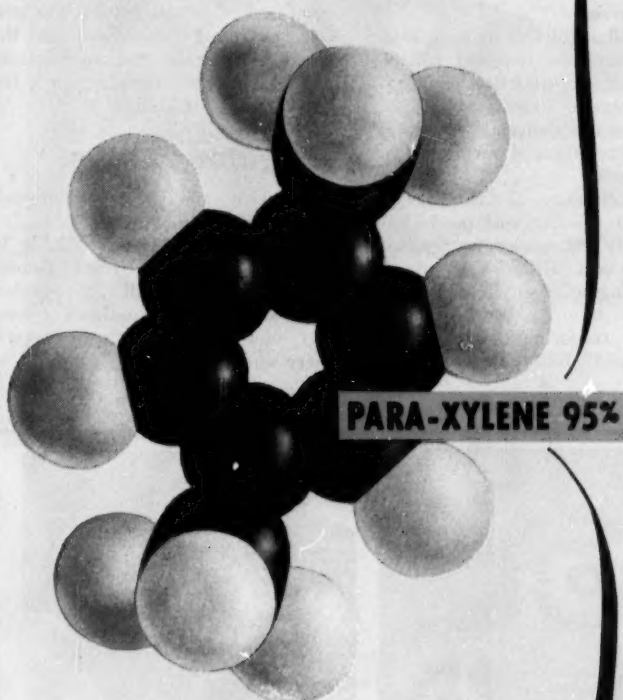
Plastics Fact Seekers

Of top-drawer interest to the plastics industry this week is news of an agreement between Armed Forces Medical Procurement Agency and Case Institute of Technology (Cleveland) under which the latter will carry out studies on the use of plastic replacements for strategic metals.

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Chemical Synthesis Possibilities

Process	Product	Usage
Oxidation.	Terephthalic acid.	Formation of polyesters, polyamides, etc.
Oxidation.	Para-toluic acid.	Synthesis of dyes.
Oxidation.	Para-tolualdehyde.	Condensation with polyvinyl alcohol for adhesive resin.
Oxidation.	2, 5-Dimethylhydroquinone.	Stabilizing agent.
Oxidation.	Terephthalaldehyde.	Resins by condensation with diamines or sodium acetate.
Oxidation and chlorination.	Tetrachloroterephthalic acid.	Flameproof textiles.
Oxidation and chlorination.	Tetrachloropara-toluic acid.	Alkyd resin modifier.
Chlorination.	Tetrachloropara-xylene.	Dielectric, heat transfer medium.
Chlorination and hydrolysis.	Para-xylol alcohol.	For xylol phosphate. Waterproofing agent. Cellulose ethers.
Chlorination hot or in ultra violet light.	Para-xylol chloride.	Lachrymatory.
Dichlorination at boiling or in ultra violet light.	Para-xylene chloride.	Synthesis.
Chlorination and hydrolysis.	Para-xylene glycol.	Modification urea-formaldehyde resins.
Chlorination in dark with iodine or iron as catalyst.	2-Chloropara-xylene and 2, 5-Dichloropara-xylene.	Solvent and/or intermediate.
Chlorosulfonation and reaction with ammonia.	Para-xylene 2-sulfonamide.	Aldehyde resins. Cellulose acetate solvent.
Nitration.	2-Nitropara-xylene.	Solvent.
Nitration and reduction.	Para-xylidine.	Dyestuffs.
Dinitration.	2, 6-Dinitropara-xylene.	Dye synthesis.
Sulfonation.	Para-xylene 2-sulfonic acid.	Intermediate.
Sulfonation.	Para-xylene 2, 5-disulfonic acid.	Dyestuffs.
Sulfonation and caustic fusion.	Para-xyleneol (2, 5-xyleneol).	Making dimethyladipic acid, antiseptics.
Acetylation in presence $AlCl_3$	2-Para-xylolmethyl ketone.	Perfume bases. Pharmaceuticals.
Ethylation and dehydrogenation.	Vinyl para-xylene.	Molding compounds. Synthetic rubbers.

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RESEARCH

The contract, signed May 3 and revealed to the public within the past fortnight, will cover research on new materials which can be used in medical, surgical, dental and hospital equipment for all branches of the armed forces.

Case Tech is the prime and only contractor for the project. It is expected, however, that eventually parts may be sub-let by Case to private chemical and plastic companies. The school has already had several inquiries from companies who want to participate in the work.

First step in the work will be a comprehensive listing of the physical properties of a broad group of plastics from current literature and other research sources.

As a corollary to this investigation, a group of additional studies will be made, with the cooperation of industry, to determine sources of supply, availability of raw materials and resins and the relative costs of various fabricating processes.

The second phase of the project—designing of specific end products—will probably get under way sometime in 1955. It will seek to give a maximum degree of interchangeability of parts, with an eye to such factors as weight, conformance to safety standards, availability of manufac-

turers and ability to stand up under the sharp knocks and stresses of field use.

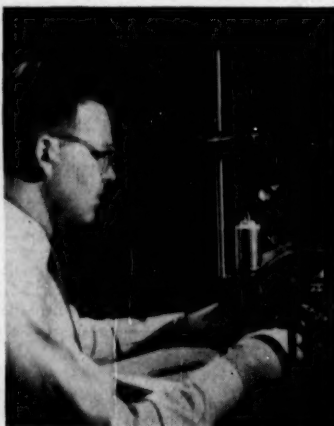
In general, a large portion of the work will be devoted to investigations of so-called rigid vinyls, also reinforced polyesters for structural uses plus work on the newer resins—polyurethanes, irradiated polyethylene and the fluorinated resins. Research will also be directed toward the expandable and foamable resins for such possible uses as cushioning and packing, and modified epons as adhesives and weather resistant coatings.

The government will have an "irrevokable, non-exclusive, non-transferable and royalty-free license" to have products (arising from the study) manufactured or new materials or new processes used "anywhere in the world" so long as that manufacture does not infringe on production of the same goods for civilians.

Laboratory Births

This week's crop of new chemicals turned up the following:

- Thiophosgene, now available in pilot-plant quantities from Rapter Laboratories (Argo, Ill.). Suggested uses are in organic synthesis (dyes, insecticides, pharmaceuticals), perfumery and rubber modification.



This . . .

HAPPIER DAYS for downcast housewives (right) beset by problems like the fallen cake shown above, or one filled with tunnels, may be forthcoming if the resonance elastomer (shown left) fulfills its promise. Developed at Monsanto's Dayton Food Technology Laboratory, this instrument is used in rheological studies (de-



May Prevent This

formation and flow of matter) on cake batters containing Monsanto leavening agents. Other posers linked to rheology: the unpleasant slickness of certain creamed corns, the occasional rubberiness of pancakes, and why it is necessary to pound the bottom of the bottle to get the catsup out. All are coming in for study.

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Intermediate

Alkyd Resins for Surface Coatings . . . Ethylene glycol is used in combination with pentaerythritol to produce alkyd resins used in making paints, enamels, and other alkyd based surface coatings.

Polyester Resins . . . Low pressure laminates used on glass fibers, asbestos, cloth, and paper, make use of polyester resins based on maleic anhydride, ethylene glycol, and vinyl type monomers.

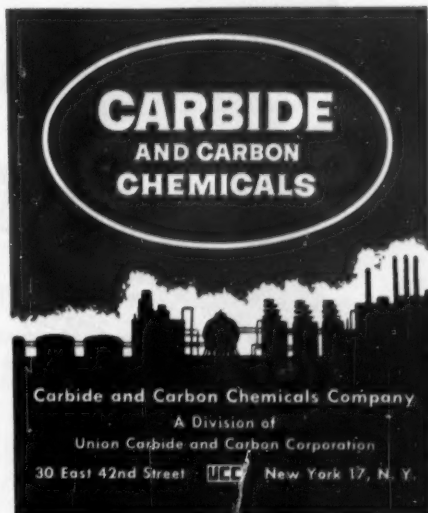
Humectant

Ethylene glycol adds strength, softness, and pliability to cellophane, paper, glue, leather, and textile fibers.

Solvent

Ethylene glycol is used as a solvent for certain stains, inks, and dyes. It is also a solvent and conducting medium in dry type capacitors.

For more information ask for Technical Information Sheet F-8327 on Ethylene Glycol. Call or write any of 23 sales offices in principal cities. In Canada: Carbide Chemicals Sales Company, Division of Union Carbide Canada Limited, Toronto.



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RESEARCH

• These new Ohio-Apex (Nitro, W. Va.) plasticizers—Adipol 810 (isodecyl octyl adipate), Dinopol IDO (isodecyl octyl phthalate), RS-1322 (plasticizer for chemically blown vinyl sponge), and Kronitex K-3 (tricresyl phosphate, viscosity at 20 C, 220-300 cps.). Another new Ohio-Apex offering is diallyl phthalate dry prepolymer for use as a thermosetting resin and cross-linking agent.

• A nonionic wetting agent, Teox 120, and a controlled sudsing detergent, Teox Compound 3, offerings of Blockson Chemical Co. (Joliet, Ill.). Teox 120 is an ethylene oxide—fatty and rosin acid compound (polyphenoxy tallate) for use in detergent mixtures, cleaners, textile scouring and wetting, de-dusting (minimizes dust in detergent compounds) and emulsifying. Teox Compound 3 consists of Teox 120 compounded with alkaline builders (including sodium phosphates), carboxymethylcellulose, and optical bleach.

• Evans Chemetics' (New York) *p*-chlorothiophenol, useful in the synthesis of potential antimalarials and in the preparation of mixed disulfides (suggested as fungicides, insecticides, and oil additives). Products obtained from the reaction of *p*-chlorothiophenol with various phosphorus and sulfur chlorides and oxychlorides are promising insecticides, plasticizers, stabilizers, and oil additives. Price range for the chemical is from \$7.50 for a 1-lb. bottle to \$2.65/lb. in ton lots.

• **Steel Center:** Jones & Laughlin Steel Corp. will build a new research center near Pittsburgh, Pa. to house a staff of 100. Slated for completion in mid-1955, the center will cost more than \$1½ million, will stress theoretical aspects of J&L's metallurgical activities. According to Herbert Graham, vice president-research, the new center is a step in the expansion and centralization of J&L research activities. Not affected: present metallurgical research at the Pittsburgh Works; coal and coke studies at Alquippa Works; and ore research at Negaunee (Mich.).

• **Heated Inlet:** One feature of Consolidated Engineering's (Pasadena, Calif.) new model 21-103C mass spectrometer is a heated inlet system for introduction and analysis of chemicals with vapor pressures too low to be analyzed at room temperatures. Intended for use with hydrocarbon waxes and other compounds in the high mass ranges, the model 21-103C has a one-piece analyzer of stainless

THE PERKIN-ELMER INSTRUMENT DIGEST

A condensation of some articles in the Spring issue of THE PERKIN-ELMER INSTRUMENT NEWS, a publication of The Perkin-Elmer Corporation, manufacturers of scientific instruments—Infrared Spectrometers, Tiselius Electrophoresis Apparatus, Monochromators, Flame Photometers, Continuous Infra-

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Norwalk, Conn.

July, 1954

Vol. 5, No. 3

INFRARED: AID TO LAW ENFORCEMENT

BY J. EDGAR HOOVER



Two of the major problems confronting the Special Agents of the FBI Laboratory are the identification of an unknown substance and the comparison

of two or more specimens from different sources. These problems are complicated by the fact that evidence unintentionally left by a subject at a crime scene, or deposited on his person or personal effects while he is at a crime scene, by its very nature is normally extremely limited. Such evidence is also frequently contaminated. The majority of items analyzed are not chemically pure samples but are, rather, in the form of finished, commercially available products. In this regard, known spectrograms, along with collections of drugs, rubbers, plastics and paints used for reference purposes, have proved to be invaluable aids in the interpretation of infrared spectrograms and the subsequent identification of unknown substances.

The infrared spectrophotometer supplements the spectrograph, visible spectrophotometer, X-ray and electron diffraction units of the FBI Laboratory. The results

of identifications made with these instruments lead to an understanding of the evidence, yield extremely useful investigative leads, and constitute valuable evidence for use in a court trial.

The facilities of the FBI Laboratory are available, without charge, to all authorized law enforcement agencies throughout the country. Specimens of evidence are forwarded to the Laboratory for exam-

ination in connection with every type of criminal case. Specimens examined in which infrared analyses have played an important role include drugs, poisons, plastics, rubber products, waxes, petroleum products and many other frequently used organic products.

Digest of an article by J. Edgar Hoover, in the Spring issue of Instrument News.

Patterns in 60 Seconds with New Model 38-A Electrophoresis Apparatus

Features Include Land Camera, Powerful Light Source

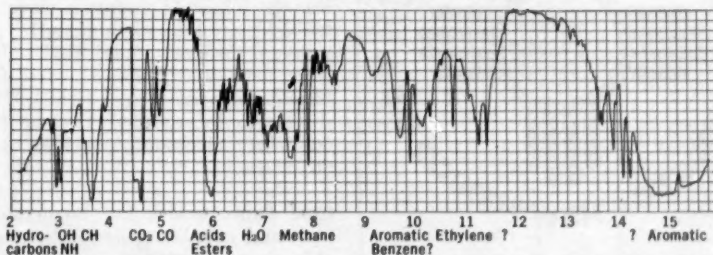
After months of field study and investigation, Perkin-Elmer has developed a new Electrophoresis Apparatus. Patterned after the Model 38 instrument, the new Model 38-A contains several significant improvements that greatly increase its performance and operating convenience. These improvements include the addition of a Land Camera, which produces finished prints of patterns in 60 seconds, a new powerful light source, redesigned entrance and exit slits, and perfected cylindrical lenses which yield patterns as perfect as

those which previously could be obtained only by the tedious scanning system.

Also featured in the new model is a new electronic power supply, a ground glass viewing hood, and a sealed schlieren cell. All of these new improvements increase the utility and convenience of the Model 38-A while retaining the simplicity of operation that was so characteristic of the older, renowned Model 38.

Overall size of the Model 38-A is 65" x 16" x 20"; weight is 120 pounds, making it a truly portable unit, that like the old Model 38, may be mounted on any convenient laboratory table top. Two and six cc Tiselius cells are still available for the new model. Except for minor rearrangement of switches and controls and the improvements noted, the new model is identical with the old.

Infrared Looks At Tobacco Smoke



What's in tobacco smoke? Lots of things, according to this infrared spectrum. In addition to carbon dioxide and water, it is easy to spot carbon monoxide, methane, ethylene and aromatics. Other absorption bands indicate nicotine and cresols. Cigar smoke showed a considerable amount of ammonia. And there are a number of bands indicating other components. This spectrum was run on the vapor phase of tobacco smoke only—studies on the liquid portion would undoubtedly reveal the presence of numerous other materials.

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RESEARCH

steel, an Isatron, and a choice of collectors.

Acquired Knowledge: Newly acquired by Arthur D. Little, Inc. (CW *Newsletter*, July 3), the research and development division and laboratories of the Merrill Co. (San Francisco) will be known as ADL's Western Laboratories Division. ADL president, Earl Stevenson, says the new lab's facilities and experience are particularly adapted to the needs of his company's clients. Charles Harford will be technical director of the new division. No newcomer to the consulting business, he has been with ADL since 1925, holds 19 patents, covering such diverse processes as the manufacture of chlorohydrins, methods and applications of spinning glass, recovery of solids from butter milk, and electrolytic deposition of cadmium, chromium, zinc, and tungsten. Harford recently returned from Egypt, where the company is conducting a general industrialization program under contract with the Foreign Operations Administration of the State Department. Business manager of the new division will be former Merrill technical director Raymond Byler.

Clean Funnel: Product contamination is avoided through elimination of valve lubricants in a new separatory funnel developed by Fischer & Porter Co. (Hatboro, Pa.). Key to the new funnel is its Ultramax valve consisting of a teflon plug which turns on the natural glazed surface of a precisely-formed section of pyrex tubing. This valve reportedly will not freeze regardless of the fluid being handled. The new funnel (adapted to centrifuging) is available in sizes from 30 ml. to 2 liters in globe, squibb, or cylindrical types.

Herbicide Patents: A series of U.S. patents recently granted to Monsanto lists the following chemicals useful as herbicides: 1-(2-alkylsulfonyl) pyridinium halides (2,657,988), alkyl xenyl ketones (2,661,274), alkyl furfurylideneacyanoacetate (2,661,275), *p*-cyclohexylphenylalkyl ketones (2,661,273), chloronitroquinolines (2,661,276).

Cool Bath: A new low temperature bath and circulating system is available from Precision Scientific Co. (Chicago). Called Lo-Temptrol, it's designed to reduce temperature rapidly, then hold it at a precise point. The Lo-Temptrol is equipped with a combination stirrer and pump, can be used both as a low temperature bath or a portable pumping system. Pro-



Here's Aluminum Chloride

in the RIGHT SIZE for your use

Most often, a particular process using aluminum chloride, anhydrous, works best with a selected particle size.

We have taken technical liberties in this picture (exposing aluminum chloride to the air) to show you the four sizes available from Hooker.

Extra work of screening isn't necessary when you specify Hooker aluminum chloride. The four sizes give you a choice that will meet just about every process requirement:

1. *Extra fine grind* is unscreened, with

90 to 95% passing 40 mesh.

2. *Fine grind* is unscreened, practically all passing 20 mesh.

3. *Coarse grind* is unscreened, 1 mesh and finer. It contains 25 to 35% finer than 20 mesh.

4. *Coarse screened* is the same as coarse grind (No. 3), but is screened to remove 20 mesh and finer.

Before re-ordering your requirements, get the facts on Hooker aluminum chloride. For technical data,

just phone the nearest Hooker office listed below, or mail the coupon today.

Need other chlorides? This is only one of several metal chlorides available from Hooker. Chlorinated organics and inorganics are specialties with us; we've been making them for more than 30 years. If you need a special chlorine-containing compound in quantity, we may be able to produce it for you economically. To find out quickly, just phone the nearest Hooker office or write us today.

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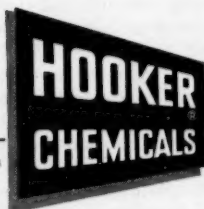
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- ☐ Data sheet on Hooker aluminum chloride, anhydrous
☐ Bulletin 100 describing Hooker products and services

Name..... Title.....

Company..... Address.....

City..... Zone..... State.....



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RESEARCH

posed applications: water and sewage tests; viscometer tests; clinical and biochemical procedures; and for cooling condensers, spectrophotometers, and refractometers. The new bath is available in two sizes, 15 gal. (room temp. to -30C) and 45 gal. (room temp. to 0 C). Coolant (alcohol, ethylene glycol, or water) circulates at 3 gal./minute.

Safety Guide: Edited by members of the general safety committee of the Manufacturing Chemists Association, Inc., a just-out manual covers a wide range of safety subjects. Entitled "Guide for Safety in the Chemical Laboratory" (CW, Apr. 17, p. 58), it's published by D. Van Nostrand Co., covers handling of chemicals, protective equipment, contamination control, first-aid instruction, toxicity, etc. A cooperative venture of the chemical industry, the 228-page book represents more than five years of research, contains over 70 charts, tables, and photographs. An entire section is devoted to the latest methods for safe handling and use of radioactive materials.

AEC Shuffle: This month, National Lead Co. takes over operation of the U.S. Atomic Energy Commission's raw materials development laboratory at Winchester, Mass. Since 1951, the lab has been run (under AEC contract) by the American Cyanamid Co. during which period operations have been expanded considerably. The Winchester laboratory is concerned chiefly with development of processes for treatment of uranium-bearing ores in the production of uranium concentrates.

New Entries: Two new consulting firms are now making their debut.

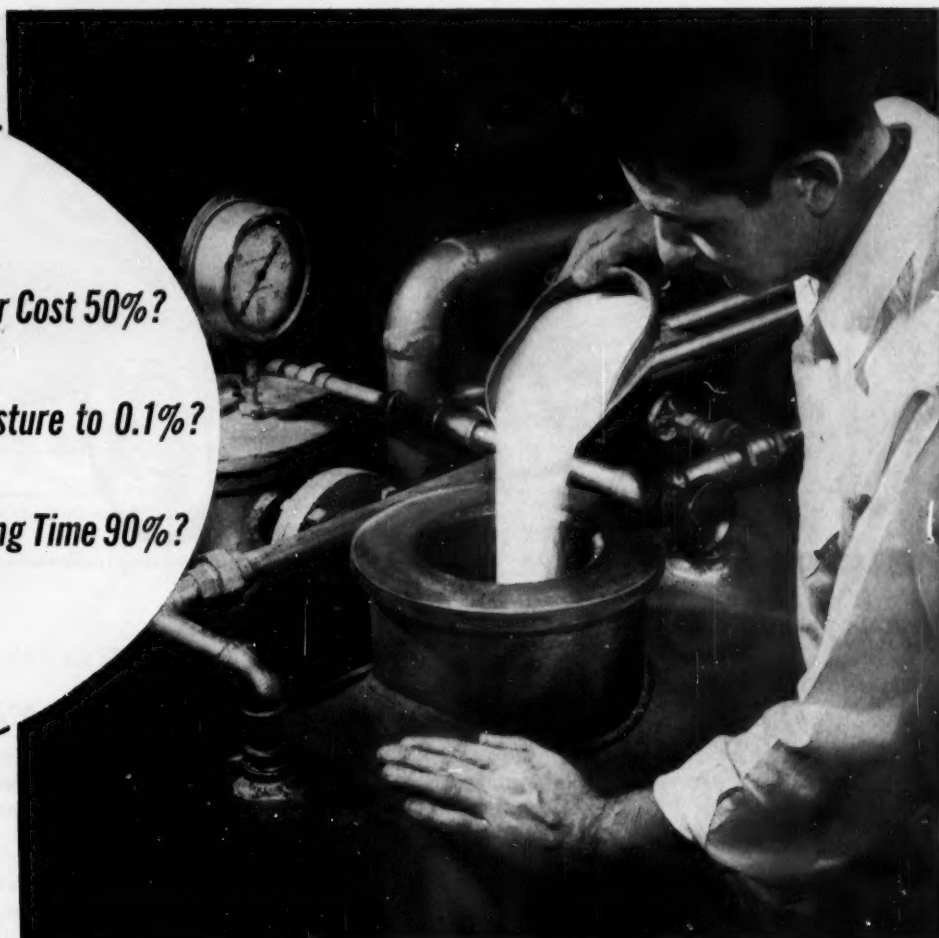
- American Rocket Co. plans consultation, research, development, production, and testing in connection with rocket and jet devices. Located near Wyandotte, Mich., the firm is headed by Alfred Zaehring, formerly with Willow Run Research Center (University of Michigan), Thiokol Chemical Corp. (Elkton, Md.), and Grand Central Aircraft Co. (Pacoima, Calif.).

- Ricklin Research Associates (Providence, R.I.) will do chemical and engineering research and development on a consulting basis for a spate manufacturing industries. Aim of founder, S. Ricklin, is to provide research for small industries. Ricklin comes from the faculty of Brown University, has served as part-time consultant in such diverse fields as plastics, electroplating, jewelry, electronics, metal finishing, textiles, etc.

What Cuts Labor Cost 50%?

What Cuts Moisture to 0.1%?

What Cuts Drying Time 90%?



Operator loads Rotary Vacuum Dryer in Stokes pilot plant.

Labor and time are reduced 50% by vacuum drying of a mixture of acetyl salicylic acid and other chemicals.

Sodium trichloracetate is reduced from 35% to 0.1% moisture content in 8 to 12 hours by vacuum drying.

Several makers of powdered aluminum and brass avert fire and explosion hazards by drying powders and solvents in vacuum . . . then recover 99% or more of the solvent in the same process.

Shellac is dried in vacuum in 6 to 8 hours per batch, a job that formerly took 72 hours!

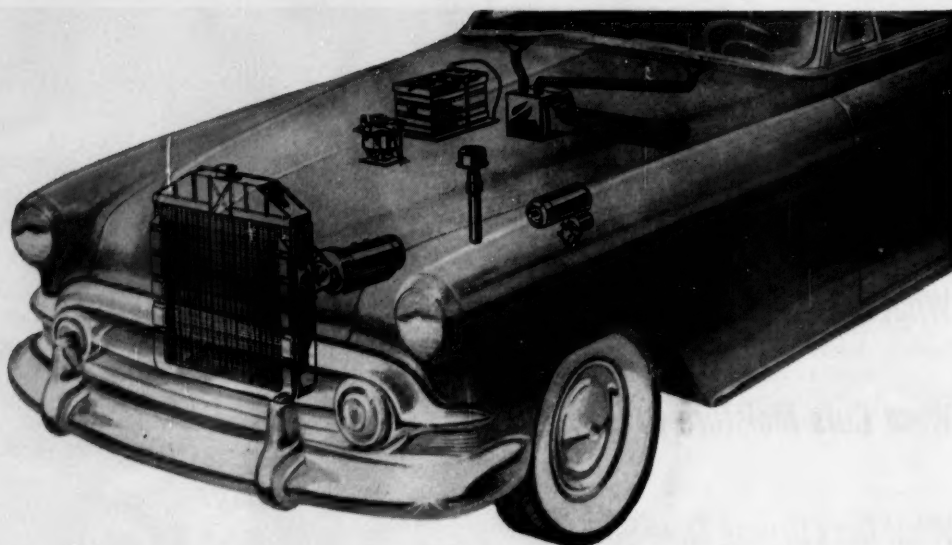
Stokes has the laboratory and pilot plant facilities to test vacuum drying of any product which offers drying difficulties. Methods, cycles, equipment, costs will be accurately determined. Stokes has 40 years' experience in vacuum technology to share with you on drying problems.

Send for an informative brochure, "Vacuum Drying," on the techniques of moisture removal from chemicals, pharmaceuticals and other industrial products.

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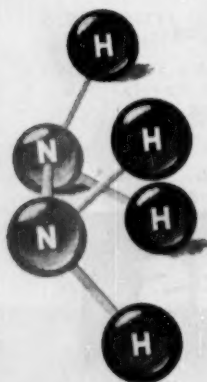
STOKES MAKES: High Vacuum Equipment, Vacuum Pumps and Gages / Industrial Tableting, Powder Metal and Plastics Molding Presses / Pharmaceutical Equipment



from Hydrazine, improved soldering fluxes

A remarkable new series of soldering fluxes has been developed by McCord Corporation, that makes possible greater economy and efficiency in production of soldered components. Based on compounds of hydrazine, these fluxes, called CORONIL, are non-corrosive and can be used without hazard. They remove oxides and other films from most of the commercially used metals such as copper and brass—as well as others—to permit more effective work and fewer rejects. Currently, these hydrazine-based soldering fluxes are being successfully applied in the manufacture of automotive radiators and other heat exchangers, parts for the electrical and electronic industries, carburetor floats, oil strainers, and various other products where effective non-corrosive soldering is essential.

from Hydrazine, new fields for chemical research



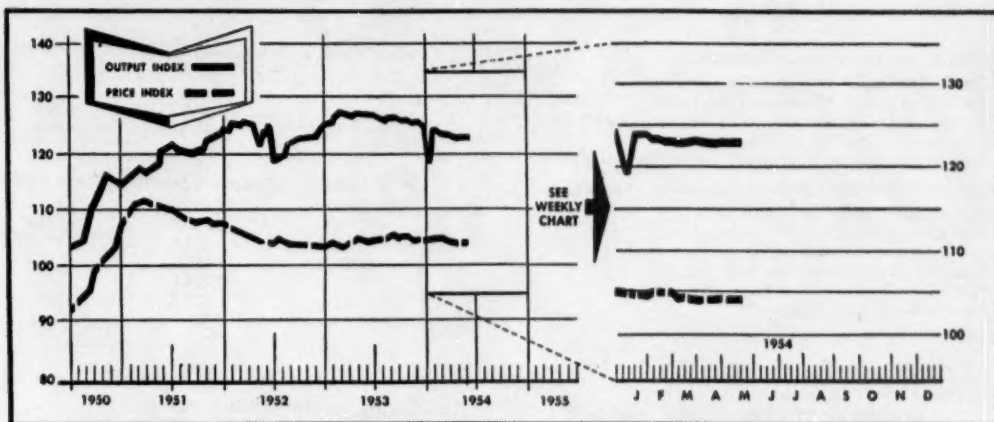
Every day, more and more interesting new applications of hydrazine are being developed. In addition to its use in fluxes, hydrazine is an important component of plant growth regulators, and an effective scavenger of oxygen from boiler feed water. As a chemical capable of reacting with a wide variety of both inorganic and organic materials, hydrazine is the starting point for countless hydronitrogen compounds. Perhaps you would like the latest information on hydrazine and its derivatives and how they might apply to your field of interest . . . if so, why not write today?



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MARKETS



CW Index of Chemical Output—Basis: Total Man Hours Worked in Selected Chemical Industries
CW Price Index—Basis: Weekly Prices of Sixteen Selected Chemicals

MARKET LETTER

While the bulk of chemical buying slows down a little for the next several weeks, sales of seasonal chemicals are going at a satisfactory clip. That's true for benzoates (food preservation), citrates and tartrates (soft drinks, fruit juices) (CW, June 26, p. 95), photographic chemicals (vacation picture-taking).

Buyers of antimony trioxide find price tags about 12% higher this week. Carload lots of the trioxide (bags, frt. alld.) are pegged at 29¢/lb., up from 26¢/lb. Relatively unnoticed by users of antimony compounds, the price of chemical-grade antimony ore has risen steadily from a January 1 price of \$3.50-\$3.60 to a current \$4.35-\$4.50 per 20-lb. unit of antimony (60-65%) contained per ton.

Backlash: there's been a depressed market in antimony for about a year; mining was curtailed in Bolivia. The latter country and Brazil were caught with short supplies when Japan placed new orders for the metal and the oxide.

The future: both the higher ore price and a flurry of interest in antimony compounds used in flameproofing—as the Flammable Fabrics Act (CW, May 8, p. 19) became law on July 1—may soon add other antimony compounds to the plussed-price list.

Large-volume production of styrene oxide comes a step nearer. Interest should rise among those who use it (as reactive diluent in epoxy resins) on the heels of a 25% paring of tank-car prices: down from 95¢, Dow Chemical now offers it at 70¢. The new price level may bid new customers into using it as a diluent in aromatic syntheses.

A target for mercury has been set by the U. S. government in the past week: a program to buy through the General Services Administration 125,000 flasks of domestic mercury and 75,000 flasks of Mexican mercury (duty of \$19 per flask to be paid by the Mexican producers) by the end of 1957 at a guaranteed minimum price of \$225 per 76-lb. flask.

MARKET LETTER

WEEKLY BUSINESS INDICATORS

	Latest Week	Preceding Week	Year Ago
CHEMICAL WEEK Output Index (1947=100)	117.5	123.7	126.7
CHEMICAL WEEK Wholesale Price Index (1947=100)	104.1	104.2	104.8
Bituminous Coal Production (daily average, 1,000 tons)	1,420.0	1,451.0	1,629.0
Steel Ingot Production (1,000 tons)	1,559.0 (est.)	1,430.0 (act.)	2,134.0
Stock Price Index of 13 Chemical Companies (Standard & Poor's Corp.)	328.8	319.8	248.2

MONTHLY INDICATORS—Employment (Thousands)

	Latest Month	Preceding Month	Year Ago
All Manufacturing	12,426.0	12,439.0	13,787.0
Non-durable Goods	5,277.0	5,230.0	5,597.0
Chemicals and Allied Products	517.8	524.8	513.1
Paper and Allied Products	435.9	433.5	446.3
Rubber Products	199.2	196.7	220.3
Petroleum and Coal Products	178.1	177.2	189.7

Purpose: to build the national stockpile of the strategic mineral, and to meet the alleged increased use of the liquid metal as a circulating medium in atomic reactors.

Skeptics hold doubts for attainment of the 200,000-flask goal, cite these figures: current U.S. annual output is from 14,000 to 15,000 flasks; Mexico's too, is about 15,000 flasks. Top domestic annual output was 51,000 flasks in 1942. U.S. industry now consumes quicksilver at an annual rate of about 52,000 flasks.

Some implications: U.S. and Mexican producers will push production in view of firm long-term U.S. contracts. The GSA will no longer buy mercury at the existing world price of \$280 per flask, may force the world price down to \$225, since the U.S. was a "residual" buyer of 50,000 flasks of last year's total world production of about 160,000 flasks.

Concentrated superphosphate production (grades made from phosphoric acid alone and containing more than 40% available phosphoric acid) continues to gain on that of the normal and enriched grades.

Just-released Bureau of the Census figures tab the jockeying for position this way: production of concentrated superphosphate by 22 plants during the period of July '53 through April '54 jumped 16% over the 347,-141 short tons produced in the corresponding 1953 season. During the same months output of normal and enriched grades fell back 6% from the earlier total of 1,455,437 short tons.

Tin has come a cropper in Alaska. A Congressional investigating committee has just heard this sorry tale: The U.S. Tin Corp., which garnered a \$3 million defense production loan three years ago, has not produced a ton of tin for the national stockpile.

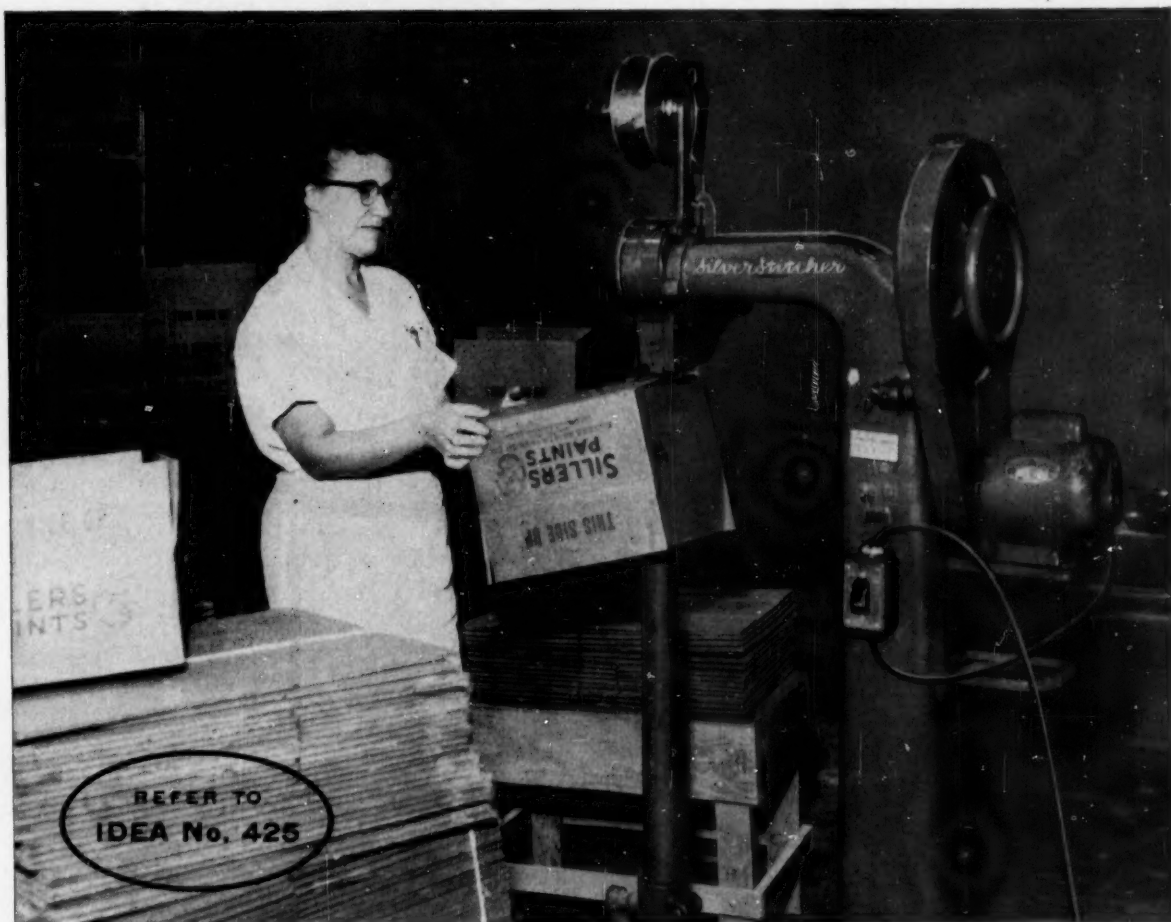
The probers find now that the tin firm lacked enough capital to justify the grant of government credit in the first place. These disclosures came just after arguments were made on behalf of keeping the Texas City (Tex.) tin smelter (CW, July 10, p. 72) going in order to help Alaska's neophyte tin miners.

SELECTED CHEMICAL MARKET PRICE CHANGES—Week Ending July 12, 1954

DOWN

	Change	New Price		Change	New Price
Dibutyl sebacate, tanks, works, dlvd.	\$.02	\$.66	Oleic acid, double dist. (white), tanks	.01	.155
Dicapryl sebacate, tanks, works	.03	.61	Stearic acid, bgs.,		
Di-hexyl sebacate, tanks, works	.02	.62	single pressed	.01	.1175
Di-iso-octyl sebacate, tanks, works,			double pressed	.01	.1225
dlvd.	.03	.61			

All prices per pound unless quantity is stated.



AIM* for EFFICIENT CARTON ASSEMBLY with **Acme Steel Wire Stitching Ideas**



Acme Idea Man,
Fred C. Hartman,
helped modernize
carton assembly at
this Los Angeles plant.

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***Acme Idea Man**
to help solve your
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When you assemble cartons as they are needed, valuable storage space can become income-producing space. The Sillers Paint & Varnish Company for example, utilized Acme Steel Idea No. 425 to achieve greater efficiency throughout the packaging operation in its new Los Angeles plant. Previously, when the cartons were glued, extensive drying time and storage space were required. Now, cartons are stored flat and an Acme Steel Silverstitcher, using coiled Stitching Wire, assembles cartons as rapidly as required. In addition to time and space savings, shipments stay safely packed and arrive damage-free.

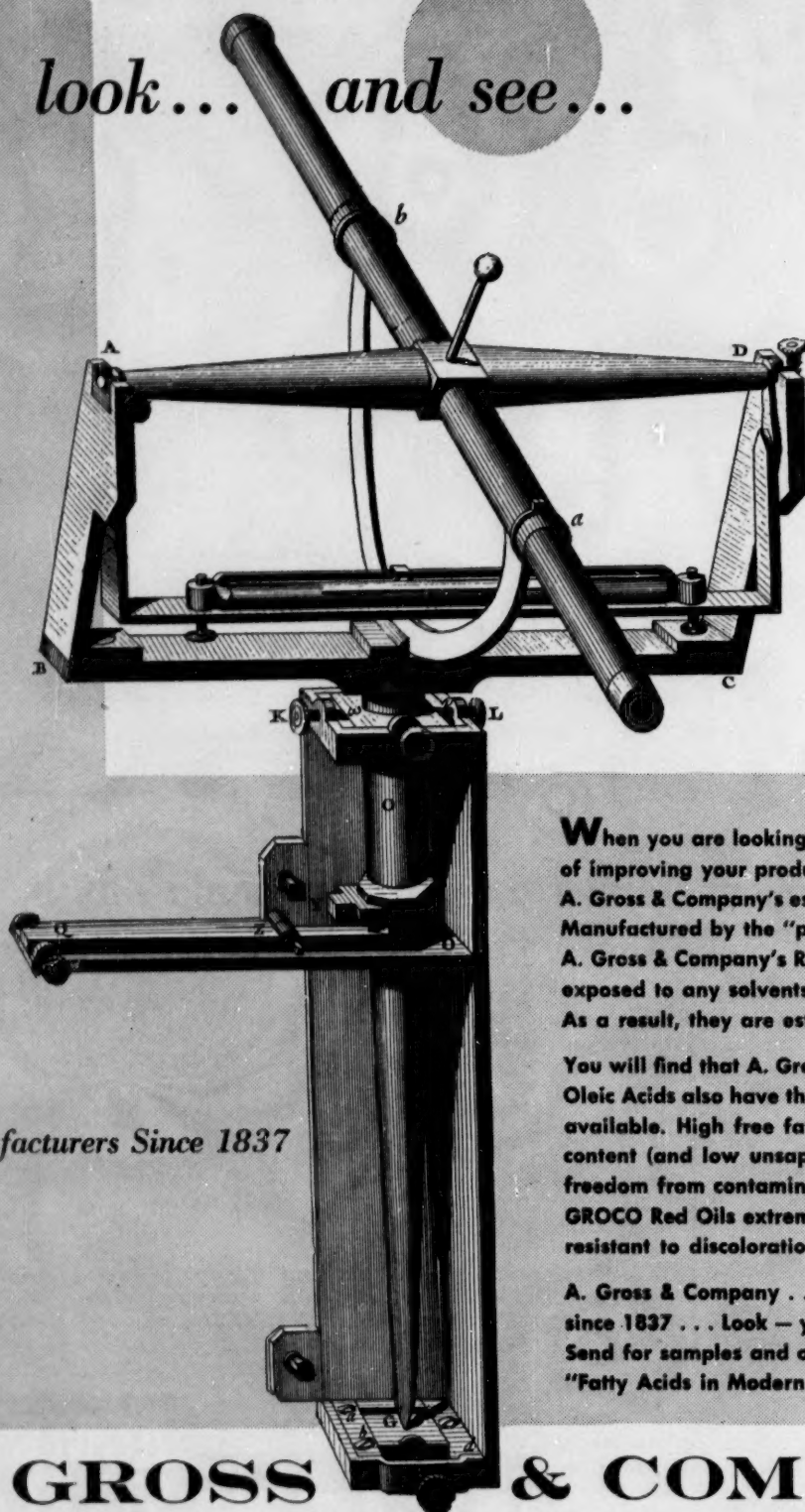
To make sure you are getting the most from your "packaging" dollar, ask your Acme Idea Man to analyze your packaging problems. Or, write Acme Steel Products Division, Dept. TV-74, Acme Steel Company, 2840 Archer Avenue, Chicago 8, Illinois.

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ANIMAL AND VEGETABLE FAT AND OIL SOURCES FOR . . . FATTY ACIDS GOING INTO THESE PRODUCTS

I. ANIMAL FATS

1. tallow and grease	Stearic acid (40-50% stearic)	Soaps, detergents, cosmetics, candles, rubber, pharmaceuticals, metallic soaps
	Oleic acid (red oil) and white oleic acid (*I.V.; 85-95)	Sulfonated oils, soft soaps, specialty textile soaps, emulsifiers, alkyd resins, chemical intermediates, plasticizers, greases, napalm.
	Animal fatty acid mixtures (I.V.: 50-60)	
	Some hydrogenated to stearic acid	Chemicals, rubber compounding, plasticizers. (See stearic above.)

II. FISH AND MARINE MAMMAL OILS

Linolenic and polyunsaturated acids (I.V. 135-140)	Alkyd resins and drying oil application, floor coverings.
Some hydrogenated to stearic acid	See Stearic acid.

III. VEGETABLE OILS

1. coconut (crude) (including palm, palm kernel, babassu)	Lauric-type acids (I.V. > 5: lauric, myristic acids, etc.)	Soaps, fatty alcohols, emulsifiers, cosmetic soaps and shampoos, shaving creams, plasticizers, napalm, rubber compounding, alkyd resins.
	Other saturated acids (I.V. < 5: caprylic, capric, lauric, myristic acids)	
	High palmitic (60% or more palmitic)	
2. soapstocks— (veg. foots)	Vegetable fatty acids (I.V.: 50-80)	Intermediates, emulsifiers, soaps, cosmetics
	Some hydrogenated to stearic.	
a. cottonseed (distilled)	Oleic, linoleic, and palmitic (I.V. 90-110)	
b. soybean (distilled) (fractionated)	Oleic, linoleic (I.V. 115-135)	

* I.V.=iodine value or number is the percentage by weight of iodine which is absorbed by a given fat or fatty acid, and is a measure of unsaturation.

Acids Sustain Fats Market

There's a trend toward fatty acids. Touting the advantage over fats and oils in quality control, makers are selling customers on the precision with which they can control the properties of their products. Too, meat packers and renderers are pushing their manufacture, trying to find profitable outlets for their mounting surpluses of tallow and grease (CW, Jan. 23, p. 95.).

The tallow- and grease-derived acids are stable members of the fatty acid industry, have been accounting for these portions of total fatty acid output: 40% of the total output of 365.3 million lbs. in 1952, slightly over 44% of last year's production of 397.1 million lbs., and a likely 45% of an estimated production of 385-390 million lbs. this year.

Fatty Acids Produced from Tallow and Grease (millions of lbs.)

	'52	'53	'54 (est.)
Stearic acid (40-50%)	47.8	59.3	51.1
Oleic acid (red oil)	73.8	85.1	93.5
Other animal unsat. fatty acids (I.V. 36-80)	24.1	32.3	30.6

Synthetic Momentum: Soap manufacturers have normally consumed about four-fifths of the domestic consumption of tallow and grease. Synthetic detergents have gained momentum, have now overtaken soap tonnage.

While sales of hard soap edged downward from 2.5 billion lbs. in 1948 to 1.8 billion lbs. in 1952 and to 1.6 billion lbs. last year, both household and industrial sales of synthetic detergents boomed from a mere 402 million lbs. in 1948 to 1.5 billion lbs. two years ago, and to an imposing 1.9 billion lbs. last year.

But despite the decline of soap output, soapers are increasing their relative consumption of fatty acids. Although the choice is still an economic one for each manufacturer, by saponifying fatty acids rather than the glycerides (natural fats and oils), he gains these advantages:

- Saponification is easier, faster, and subject to greater control; more batches of soap can be produced per day, while equipment and many overhead costs remain constant.

- Greater flexibility in the choice of raw materials is possible; it's easier

to change product characteristics with consumer demand, whether it is a specialty or an individual soap.

- Savings are made in certain equipment costs and in steam.

- The yield of anhydrous soap is higher than when whole oils or fats are used.

By and large the soap manufacturers obtain a generous variety of products by their choice of fatty acids and/or fats and oils. Although it's a question of economics whether a fatty acid or an appropriate oil or fat is used in the production of a soluble soap, it's not so with the insoluble soaps. Fatty acids are of growing importance in the making of metallic soaps (lithium, calcium, aluminum, barium, and combinations) for use in commercial greases (CW, May 1, p. 55). The grease makers require the uniformity of fatty acid mixtures in their newer formulations.

A good guess is that soaps consume about a third of all the vegetable fatty acids, a share second only to that taken by protective coating products (paints, varnishes, and alkyd resins).

Fatty Acids Produced from Vegetable Sources* (millions of lbs.)

	'52	'53	'54 (est.)
Coconut, palm, babassu oils			
Lauric-type acids (I.V.>5)	31.5	20.4	19.8
Other satur. acids (I.V.<5)	10.5	10.1	12.6
Soapstocks (veg. foots) unsat. acids			
Max. I.V. 115 (includ. marine)	43.5	25.0	25.1
I.V. 116-130	22.0	26.6	21.9
I.V.>130	24.8	26.8	23.9
High palmitic (over 60%)	5.4	6.1	5.1

Textile finishers probably use the widest array of soaps, buy or prepare a large number of fatty acid mixtures and derivatives for wetting, softening, and scouring agents. Each is generally in the form of a neutral soap designed for specific fibers and processing steps. This trend to specialized textile soaps demand an ever closer control of product properties, requires the use of refined fatty acids rather than whole oils or fats.

*The fatty acid production figures of the tables of this article were compiled by the Fatty Acid Division of the Association of American Soap & Glycerine Producers, Inc., New York, N.Y. The 1954 figures are estimates based on the first five months' data.

Although fatty acids don't serve as many functions in the rubber industry as in the textile, they do have three principal uses (activation, acceleration, and softening) in rubber compounding. The rubber industry alone accounts for over one-fourth of annual stearic acid consumption.

- As softeners, fatty acids help to disperse carbon black and certain pigments in the rubber while it is hot.

- The fatty acids help solubilize the zinc oxide activators in obtaining the full benefit from most organic accelerators.

- During milling and extruding, the fatty acids aid in lubrication.

More Stearic Acid: Vegetable oil foots also yield a considerable quantity of stearic acid by hydrogenation—a quantity which is not included in the tables above. The comparative magnitude of the stearic acid obtained by hydrogenation from animal grease, vegetable oil foots, and fish and marine mammal oils is shown in this table:

Fatty Acids Produced by Hydrogenation (millions of lbs.)

	'52	'53	'54 (est.)
Stearic acid (vegetable and animal)	65.5	89.3	89.8
Stearic acid (fish and marine mammal)	14.5	16.1	12.3

Detergent Outlook: The consumption of fatty acids by the detergent industry will not likely make up for the market taken from soaps: the detergent value of fats or oils converted to synthetics is about 3.5 times as great as the equivalent fat converted to soap. A similar ratio holds for fatty acids.

Detergent makers have largely preferred the petroleum- or coal tar-derived alkylaryl sulfonates over the fatty alcohol-derived alkyl sodium sulfates (the major surface-active raw materials for nearly all household detergents). Reason: prices of the former have been much more stable than the sharp and often unpredictable oscillations of those of the fats and oils from which the fatty acids are derived.

The demand for better control of quality by the use of fatty acids in soapmaking has its counterpart in the production of resynthesized drying oils and alkyd resins. In fact, alkyd resins are now the chief consumer of

the unsaturated vegetable fatty acids. The useful limits of the percentage of oils or fatty acids in the glycerol phthalate alkyd resin formulations range between 25-75%.

The fatty acids in drying oils are being used more and more to upgrade their parent product for use in paints, varnishes, and enamels. The fatty acid fractions (mixtures of oleic, linoleic, and linolenic acids) of soybean and linseed oils are fractionated out. Processors re-esterify these acids to give purer oils having combinations of drying speed and film qualities impossible with the natural oils.

Certain paint driers make use of the metallic salts of fatty acids; e.g., linoleates. Metallic stearates are a part of flattening agents, not to mention certain water-repellent pharmaceutical products.

Panopoly of Derivatives: A rapidly growing complex of fatty acid derivatives—esters, amines, amides, nitriles, polyoxyethylene derivatives—is leading to new emulsifiers, plasticizers, surface-active agents, etc. Nearly every industry from ore flotation to textile finishing will test the new products. Their acceptance will likely soon swing production of fatty acids over the 450-million-lb. level.

The Shift from Tin

Chemical outlets will be building up for tin-replacing materials and treatments for metal cans despite government stockpiling of tin. The threat to Indonesian tin sources from communist aggression and higher tin prices (CW, July 10, p. 72) brought up the topic of the tinless can at the recent meeting at Los Angeles of the Institute of Food Technologists. Here's what they concluded:

- Most of the tinless metal cans for some years to come will have to be manufactured from steel itself or steel coated with other metals. That's the only feasible way to satisfy an estimated annual demand for 35-40 billion metal cans.

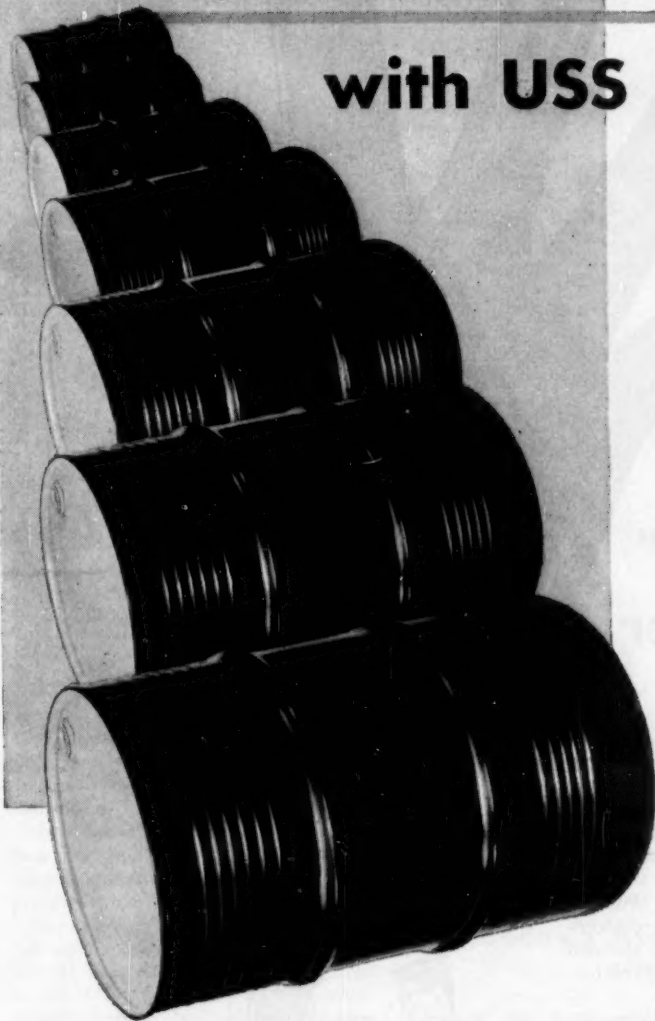
- Although steel sheet is one of the least expensive metals, untinned sheet would have to be enamelled or chemically treated on both sides to prevent corrosion.

- Gauge for gauge, aluminum has the advantage of being only a third as heavy as tin plate used in cans, but the relative softness of aluminum is a disadvantage.

- Several techniques to apply aluminum coatings to sheet steel are near the pilot-plant stage.

- Zinc-plated or nickel-plated steel for cans is discounted except for uses where other alternates are not suitable.

You get "built-in" quality control with USS Steel Drums



EFFECTIVE quality control can be extended beyond your own manufacturing operations. It can go right along with your product after it leaves your plant . . . when you use USS Steel Drums. This means the end of costly customer claims that result from scale, dirt, grease and rust contamination. For now, with scale-free, rust-inhibited USS Steel Drums, you can guard the quality of your product between the time you ship it and the time the customer actually uses it.

These sturdy steel containers are made of high grade USS Steel. A truly effective rust-inhibiting coating has been applied to a surface that has been cleaned — physically and chemically — so completely that the protective coating will not flake off or be undermined by rust and corrosion. USS Steel Drums are better for you . . . better for your customers.

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United States Steel Products fabricates stainless, galvanized, tinned, painted and decorated drums and pails. Furnished in a wide range of capacities with a variety of fittings and openings to meet your particular requirements.

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UNITED STATES STEEL

How "Doc Barrett" gave a glove maker a big hand

The Pioneer Rubber Company of Willard, Ohio, makes work gloves . . . and is constantly on the alert for ways of making better gloves at lower cost.

Recently, Pioneer asked "Doc Barrett's" help in formulating a processing material more manageable in production and more efficient in end use than what was being used. Working together, Pioneer and "Doc Barrett" came up with custom-formulated plastisols which not only simplified and speeded glove manufacture, but produced a longer-lasting, better-looking product as well.

"Doc Barrett" has helped manufacturers in a wide variety of lines perfect their products for eventual consumer use. Perhaps he can help you.

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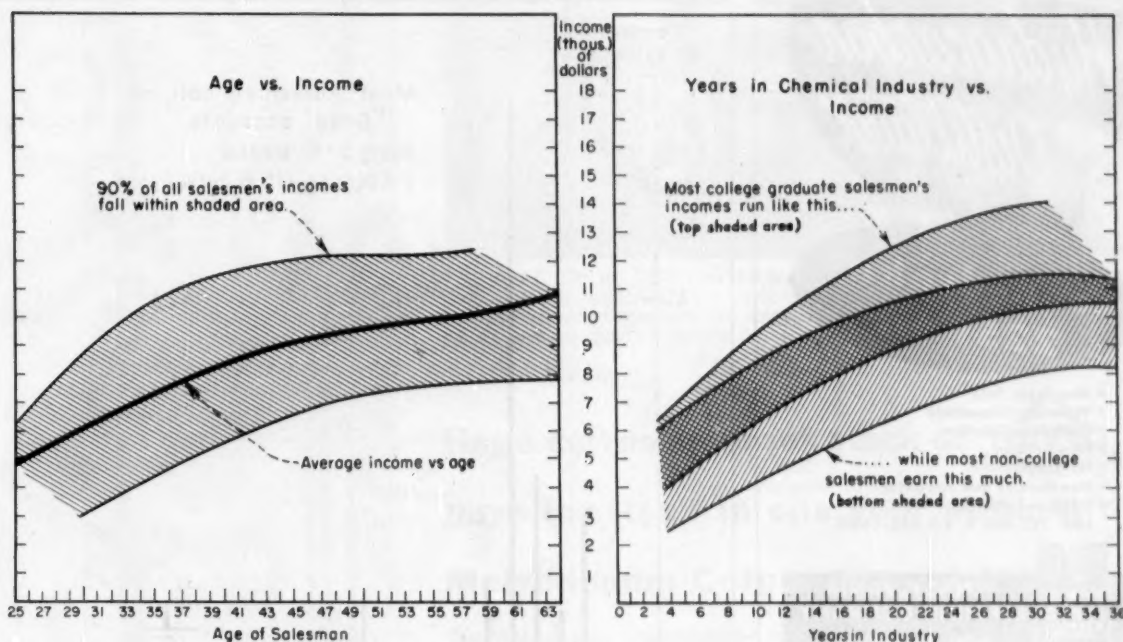
BARRETT DIVISION, Allied Chemical & Dye Corporation,
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Measuring a Chemical Salesman

With renewed attention currently being given to the job of selling, last week CW completed a poll to take the measure of today's chemical sales representative. Here's the report of what he's like and how he arrived at his present status, plus an account of how he spends his work time.

Compiled with the cooperation of The Salesmen's Assn. of the American Chemical Industry (popularly known as SAACI) CW's sample is a cross-section of those chemical industry men who call themselves "salesmen." Not included in the replies from questionnaires sent the 750-odd SAACI members: any who consider themselves "sales managers" of one kind or other. About one-third of SAACI's members term themselves simply as chemical "salesmen."

All Over Map: From a quick glance at the replies, this much is certain: few chemical salesmen can be considered "average" in more than one respect. They range from the neophyte fresh from training to the old-timer who has been making his rounds ever since there was a chemical industry. (One man reports he's been selling for fifty years.)

Or salary-wise: one salesman, likely a beginner, may receive a salary less

than \$4,000; in contrast, a top man frequently averages \$15,000 or more annually.

Statistically, of course, some composite, some "average" salesman (*see box*) can be found. But in chemicals,

any salesman worthy of the name seems to be able to sell regardless of his background, education or age. An extreme example of a non-average individual: an older man who had sold most of his life in other fields but had

Today's Average* Chemical Salesman, statistically speaking,

- is 39.4 years old; 60% of all salesmen are between 32 and 46.
- earns \$9,100/yr.; 60% of all salesmen earn at least \$7,000 but not more than \$11,000.
- has 0.6 college degrees. Half have no degree, a few possess advanced degrees.
- has worked in the chemical industry 14.2 years; 60% have been in chemicals for between 8 and 21 years.
- has sold chemicals 10.6 years; 60% have been selling them between 5 and 17 years.
- is a member of 1.7 associations (including SAACI). Approximately half (SAACI salesman members) belong to no other association.

* compiled from the membership (salesmen only) of The Salesmen's Assn. of the American Chemical Industry, Inc.

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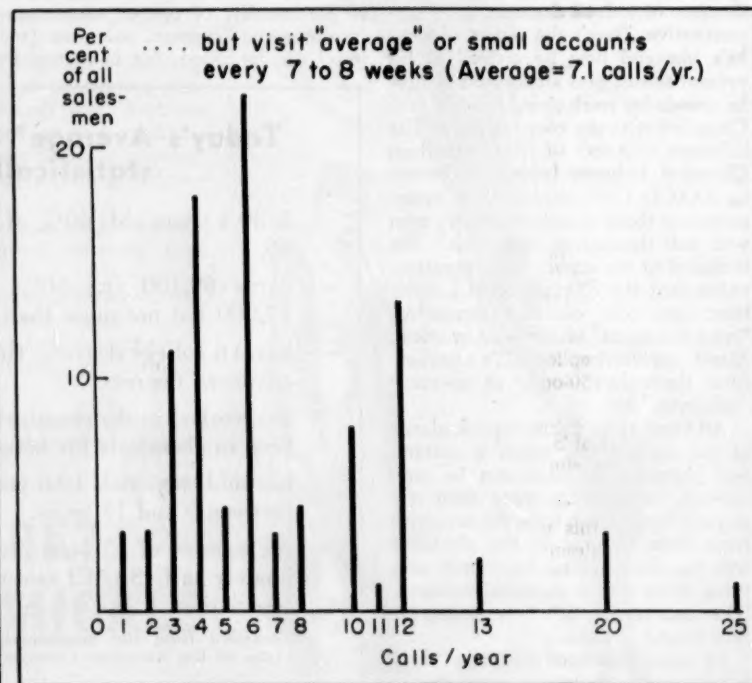
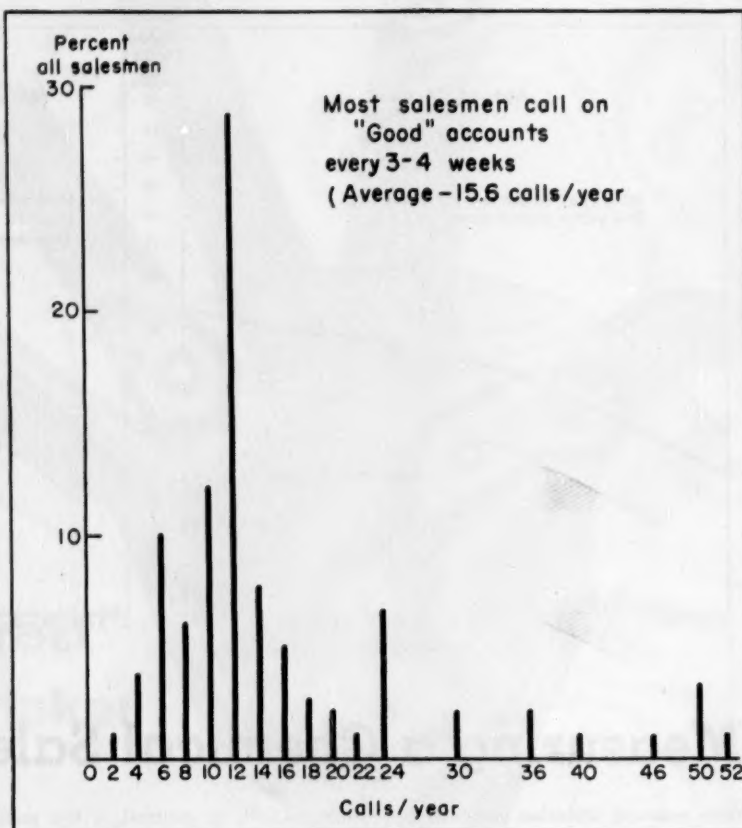
PALL

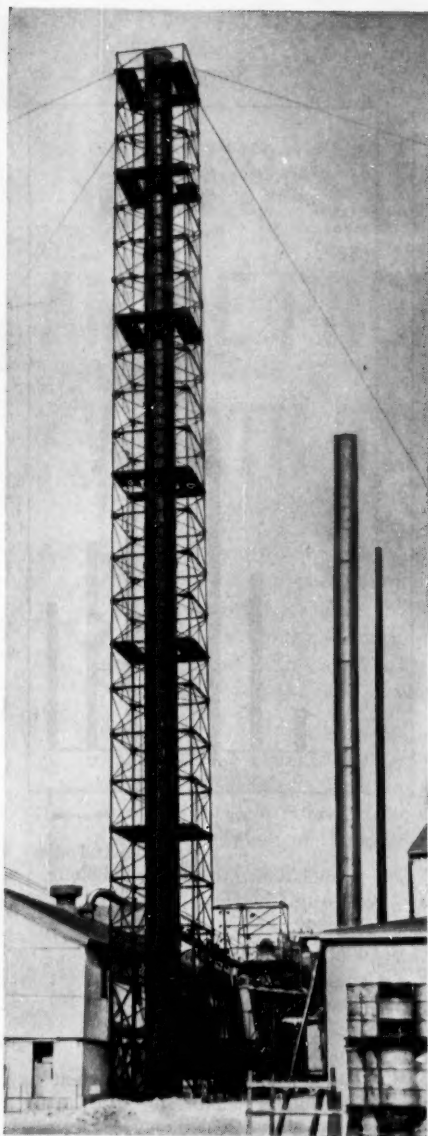
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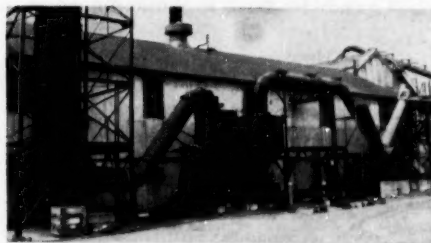
DISTRIBUTION

Story begins on p. 89

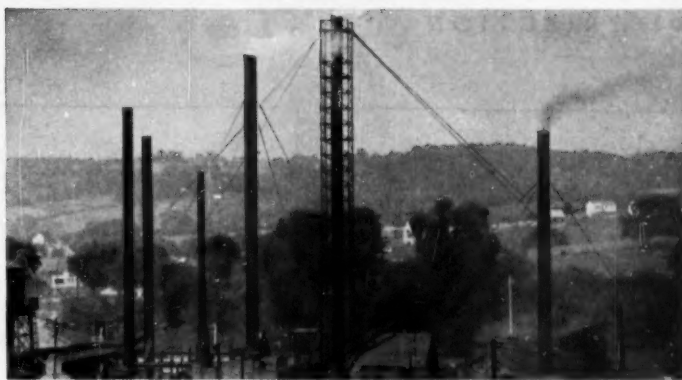




IN THE AIR, towering 200' high is a Haveg stack "that couldn't be built." The steel framework and rigid tie lines keep the stack permanently in position.



ON THE GROUND, more Haveg fume duct, scrubbers, precipitators, fans, valves control corrosion.



THE TALL HAVEG STACK at the Washington, Pa. plant of the Molybdenum Corp. of America increased the efficiency of the corrosive fume removal system and helped management cut costs. It was made possible by the correct use of supports, planned by the refiner's engineering staff.

Huge corrosion-proof stack of **HAVEG** pays for itself in one year at plant of **Molybdenum Corporation of America!**

The Molybdenum Corporation of America had a costly corrosion problem and they solved it themselves, with the erection of the world's tallest stack of Haveg. It is 200' high with a 5' diameter and is a major part of the fume removal system at the molybdenum and tungsten refiner's Washington, Pa. plant. Haveg replaced an alloy stack with a service life of less than one year, and has already paid for itself.

It took engineering skill and imagination by Molybdenum Corporation officials to plan such a king-sized use of a plastic material. For years Haveg had helped them fight corrosion in the plant, but could it be built into a stack tall enough to do the job?

Sure, Haveg can be big. It has adequate physical strength for self-supporting equipment. Sections can be built up, with standard metal flanged connections. But how could sway be controlled? Did Haveg lend itself to this type of construction?

The answer is in the photos. By spacing the supporting steel framework far enough out from the Haveg sections, a stack was built so free of sway that a transit could not detect any.

Also, the outstanding corrosion resistance of Haveg gave the refiner a stack that has every evidence of lasting for years, without repairs, without the previous costly yearly replacement.

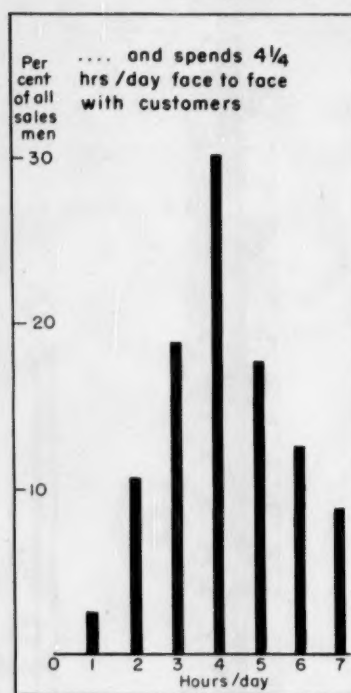
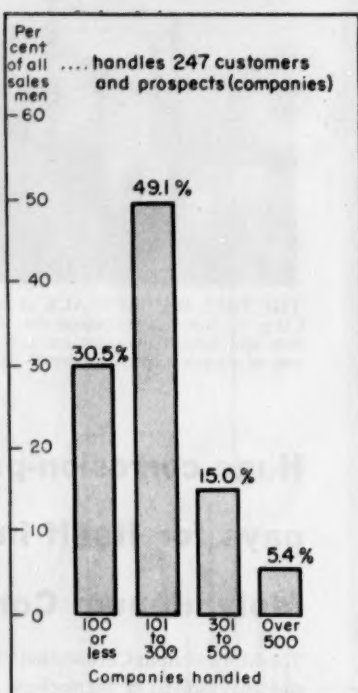
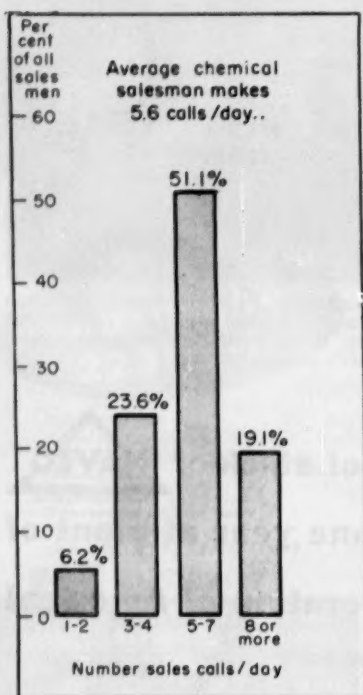
This is a good example of what can be done with Haveg, a plastic material sold in finished form, as stack sections, towers, tanks, piping, valves, etc. Find out all the ways Haveg can help you fight corrosion. Call the sales engineer listed. Write for the big 64-page illustrated Bulletin F-6 with size and chemical resistance charts, design specifications.

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July 17, 1954 • Chemical Week

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Story begins on p. 89



shifted to chemicals only recently. Financially, he's doing far better than the average.

Matter of Degree: CW found that on an average, holders of technical degrees make a little—not a lot—more money than their non-degree brothers. The spread between degree (largely B.S.) holders and non-college men is only \$400 annually; average income of the college man is \$9,300 compared with \$8,900 for the non-technical man.

This contrast in income shows up more sharply when salesmen's age and years of experience in chemicals are added to the picture. While earning only slightly more, the average degree man is about four years younger (37.3 years) than the non-degree man (41.5 years). And presumably catching up the years spent at school, he has reached his present spot after 12.3 years in chemicals, almost exactly four years less than the 16.2 years in-industry experience of the non-degree holder.

Short Line: Among the younger and middle age groups, most chemical salesmen arrived in the industry quite early in their careers. Holders of technical degrees, particularly, have spent almost all their working lives in chemicals. As a rough estimate of all SAACI respondents: 80% of their time since leaving school has been in the in-

dustry. Most exceptions: older men in the non-college group.

Once having made the decision for chemical work, the average salesman either shifted or drifted into sales work early in his chemical career. And between college and non-college men, there is practically no difference in the percentage of sales years in terms of total years in chemicals:

	Years in chemical industry		%:
	Total	Sales	Total Sales
College grad.	12.3	9.3	75.7%
Non-college	16.2	12.0	74.1%

SAACI members were also asked to show by what route they arrived at chemical sales. Almost half the present salesmen stated they had always been salesmen in some field or other.

Concerning the remaining half, i.e., those with previous non-sales work, most repliers mentioned research and production as their earlier experience. Relatively few came from the office, purchasing, technical service, engineering, market development, analytical laboratory and accounting.

Joiners: By tradition, most salesmen are reputedly "joiners." SAACI's salesmen members, however, vary greatly in this respect. Analysis of other-than-SAACI membership checked off like this:

Association	Percent SAACI salesmen who belong
American Chemical Society	18.9
Toilet Goods Assn.	7.8
Commercial Chemical Development Assn.	4.4
Other assns. membership "mentions"	21.1

Only a scattered few salesmen in SAACI claim membership in as many as four other associations.

What He Does: As part of answering the CW questionnaire, the salesman gave an accounting of how he spends his time. In particular, he reported:

- How many times/year he calls on his "good" accounts.
- How many times/year he calls on his "average" or smaller accounts.
- How many calls he makes, on an average, during a work day.
- How many customers and prospects (companies) he handles.
- How many hours/day he spends actually face-to-face with his customers.

The answers to these questions are graphed beginning on page 90. As a spot generalization: the work habits throughout the industry varies enormously. Probable reasons for the wide range:

WATER-SOLUBLE AMINE PRODUCTS WORTH TRYING



Many new opportunities for product improvements are offered by Hercules' group of water-soluble rosin amine derivatives. Most important of these is RADA (Rosin Amine D Acetate), a water-soluble acetate salt.

Dispersible in hydrocarbons and alcohol, RADA is a cationic surface active agent that adsorbs strongly on cellulosic and siliceous materials. Readily available in either solution or paste form, this acetic acid salt of Hercules' Rosin Amine D suggests a wide scope of applications.

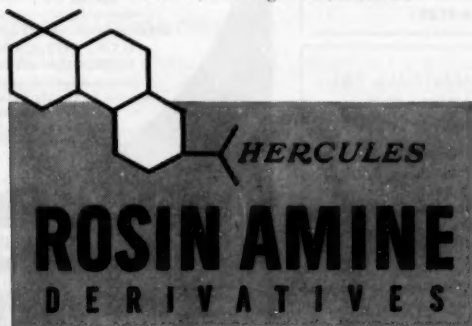
The water-soluble Polyrad® group, ethylene oxide members of the Hercules' rosin amine family, has also indicated its usefulness in various products. Collectively, RADA and the water-soluble Polyrad chemicals exhibit properties of value in bactericides, fungicides, corrosion inhibitors, as well as anti-stripping agents for cutback asphalt, wetting agents in textile processing, flotation agents, and emulsifiers—to mention just a few.

To learn more about the versatile Rosin Amine D family, write us for further information on the oil-soluble, water-soluble, and acid-soluble types.

Naval Stores Department

HERCULES POWDER COMPANY

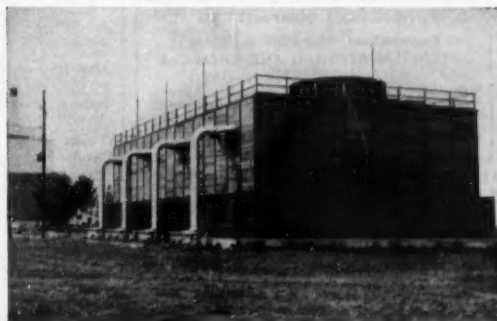
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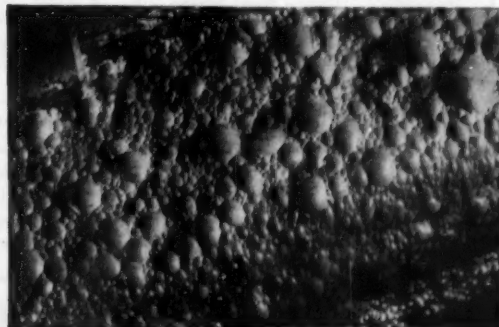
ANTI-STRIPPING AGENT—Hercules RADA added to cut-back asphalts improves adhesion to wet siliceous aggregate and helps prevent subsequent stripping by water.



WETTING AGENT—As an aid in textile processing, the water-soluble amine products have shown their usefulness as wetting agents.



WATER TREATMENT—Several amine derivatives are useful in control of bacteria and fungi in cooling towers and in secondary recovery operations.



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NAS4-3

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- Number of accounts handled per salesman.

- Size and complexity of normal individual orders.

"Good" vs "Average": The contrast in treatment of "good" and of "average" accounts assumed an interesting pattern. Practically without exception and regardless of whether a man called on his best customers often or seldom, he devoted considerably less attention to his mediocre accounts. This was almost a universal pattern, the same for the once-a-week or the three-times-a-year caller.

However, lumping all salesmen and all accounts into a single figure, the chemical salesman's call pattern averages close to one commonly accepted figure (11 times/year) for all U.S. industrial salesmen.

Chemicals vs Others: In several other respects, too, the "average" chemical man allots his time much the same as does the average U.S. industrial salesman. The comparisons:

- Although some chemical sales-

men make as few as one or as many as eight-plus calls/day (see chart), the average of 5.6 calls/day is close to the over-all U.S. industry average of 5.

- Although many handle fewer than 100 accounts and some more than 500, the average chemical representative, with 247 customers and prospects, is spread just slightly thinner than the U.S. average of 216.

- With calls and customers close in number to all-industry figures (determined elsewhere), it's not surprising that in actual hours of daily face-to-face discussion with his customers, the chemical man's time is almost average. The figures: chemical, 4¼ hours/day; U.S. average, 4 hours/day.

No Average: Even limited to the CW poll sample, certain conclusions becomes evident. Some of these:

- No average chemical salesman actually exists. Today's representatives vary in age, income, background and work habits as widely as perhaps any single group in industry.

- Taken as a statistical average,



Oregon Warehousing

ACQUIRED only several weeks ago, chemical warehousing in the Holman Transfer Company's new storehouses is already under way.

Long a specialist in chemical storage, the Portland, Ore. firm reports that its chemical business has mounted steadily for the past nine years. According to company representatives, the growing chemical needs of the Northwest's fast-

sprouting population and industry necessitated the acquisition.

Addition of the two warehouses will provide the company these benefits: 134,000 sq. ft. of storage space; more efficient handling; greater safety; lessened contamination in event of breakage.

Holman also operates three other warehouses and a distribution terminal.

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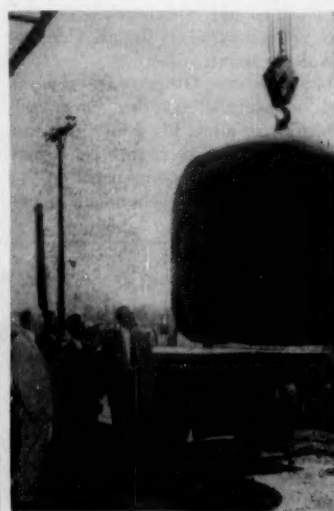
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DISTRIBUTION . . .

the chemical salesman compares closely with his industrial selling confreres throughout the country.

Sales Office Expansions: On its way up in Detroit is a new warehouse and sales office building for Parke, Davis & Co. Completely separate from the firm's main Detroit facilities, the building will have some 40,000 sq. ft. of office and warehouse space.

• Pennsylvania Industrial Chemical Corp., Clairton, Pa., has established a Detroit District Sales Office. The area served encompasses Ohio, Kentucky, Michigan, part of Indiana.



Big Bag for Black

SUPER-SIZE CONTAINERS with low shipping and handling costs are becoming increasingly the order-of-the-day (CW, April 17, p. 103). Latest to join the trend to jumbo packaging is the Firestone Tire and Rubber Co. Above, a group of Firestone officials inspect the first shipment of carbon black in a new five-ton collapsible fabric and rubber container.

Completely loaded, the sack stands eight feet high, has an eight-foot diameter. Designed for shipment of carbon blacks needed in less-than-tank car lots, the container is filled at the top and unloaded through a canvas spout and valves at the bottom. Big advantages of the big bag:

- Easily adaptable to barge, truck, or rail shipment.
- Reduced waste and shipment costs.
- Increased plant cleanliness.

When you're face to face with a special situation

Does a packaging "bug" have you stymied? Whether it involves equipment, handling in transit, or a special feature in your Multiwall Bag itself, chances are Union has helped someone solve a similar problem. Take advantage of this diversified experience.

UNION MULTIWALL BAGS

UNION BAG & PAPER CORPORATION

Woolworth Building, New York 7, N. Y.



Which of these Fluorine Compounds do you need?

☒ for process uses

☒ for research

FLUORINE Elemental Fluorine

ACIDS

Fluoboric Acid
Fluosulfonic Acid
Hydrofluoric Acid, Anhyd.
Hydrofluoric Acid, Anhyd. High Purity
Hydrofluoric Acid, Aqueous Tech.
Hydrofluoric Acid, Aqueous, Purif. & Reag.

ACID FLUORIDES

Ammonium Bifluoride
Potassium Bifluoride
Sodium Bifluoride

ALKALI FLUOBORATES

Ammonium Fluoborate
Potassium Fluoborate
Sodium Fluoborate

ALKALI FLUORIDES

Ammonium Fluoride
Potassium Fluoride, Cryst. & Anhyd.
Sodium Fluoride, Tech.
Sodium Fluoride, Reagent

DOUBLE FLUORIDES

Chromium Potassium Fluoride
Potassium Ferric Fluoride
Potassium Titanium Fluoride
Potassium Zirconium Fluoride
Sodium Zirconium Fluoride
Sodium Silico Fluoride
Potassium Aluminum Fluoride

METAL FLUORIDES

Aluminum Fluoride
Aluminum Fluoride, Crystal
Antimony Trifluoride
Antimony Pentafluoride
Barium Fluoride
Cadmium Fluoride
Calcium Fluoride
Chromium Trifluoride
Cupric Fluoride
Ferric Fluoride
Lead Tetrafluoride
Magnesium Fluoride (Not Optical Grade)
Mercuric Fluoride
Manganese Trifluoride
Molybdenum Hexafluoride
Nickelous Fluoride
Selenium Hexafluoride
Silver Difluoride
Strontium Fluoride
Titanium Tetrafluoride
Tellurium Hexafluoride
Tungsten Hexafluoride
Zinc Fluoride
Zirconium Tetrafluoride

Boron Fluoride Phenol Complex
Boron Fluoride Ammonia Complex
Boron Fluoride Diacetic Acid Complex
Boron Fluoride Di-n-Butyl Ether Complex
Boron Fluoride Dihydrate
Boron Fluoride Piperidine Complex
Boron Fluoride Ethyl "Cellosolve" Complex
Boron Fluoride Hexamethylene-tetramine Complex
Boron Fluoride Monoacetic Acid Complex
Boron Fluoride Para-cresol Complex
Boron Fluoride Triethanolamine Complex
Boron Fluoride Urea Complex
Sulfur Hexafluoride

METAL FLUOBORATE SOLUTIONS

Cadmium Fluoborate
Chromium Fluoborate
Cobalt Fluoborate
Copper Fluoborate
Ferrous (Iron) Fluoborate
Indium Fluoborate
Lead Fluoborate
Nickel Fluoborate
Silver Fluoborate
Stannous (Tin) Fluoborate
Zinc Fluoborate

HALOGEN FLUORIDES

Bromine Trifluoride
Bromine Pentafluoride
Chlorine Trifluoride
Iodine Pentafluoride

GENETRON® ORGANIC FLUORINE COMPOUNDS

Fluoromethanes

Trichloromonofluoromethane	CCl ₃ F
Dichlorodifluoromethane	CCl ₂ F ₂
Monochlorodifluoromethane	CHClF ₂
Trifluoromethane (Fluoroform)	CHF ₃
Monochlorotrifluoromethane	CClF ₃

Fluoroethanes

Difluoroethane (Ethylidene fluoride)	CH ₃ • CHF ₂
Difluoromonochloroethane	CH ₃ • CClF ₂
Tetrachlorodifluoroethane	CCl ₃ • CClF ₂
Monochlorotrifluoroethane	CH ₂ Cl • CF ₃
Trichlorotrifluoroethanes	CCl ₂ F • CClF ₂

Dichlorotetrafluoroethanes

Monochloropentafluoroethane

Fluoroethylenes

Difluoroethylene (Vinylidene fluoride)	CH ₂ = CF ₂
Dichlorodifluoroethylene	CCl ₂ = CF ₂
Trifluorochloroethylene	CClF = CF ₂
Monochlorodifluoroethylene	CHCl = CF ₂

Fluorobromoethanes

Dibromodifluoroethane CH₂Br • CBrF₂

Fluorinated Acetic Acids and Anhydrides

Dichloromonofluoroacetic acid and anhydride	CCl ₂ FCOOH and (CCl ₂ FCO) ₂ O
Monochlorodifluoroacetic acid and anhydride	CClF ₂ COOH and (CClF ₂ CO) ₂ O

Fluorinated Acetones

Tetrachlorodifluoroacetone	CCl ₃ F • CO • CCl ₂ F
Trichlorotrifluoroacetone	CCl ₂ F • CO • CClF ₂
Dichlorotetrafluoroacetone	CClF ₂ • CO • CClF ₂

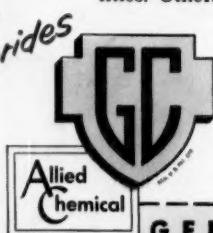
Various Other Organic Fluorine Chemicals

Through aggressive research and development, General Chemical sets the pace in fluorine chemistry . . . making more and more of these versatile chemical "tools" available so that your development program today can become tomorrow's production.

Listed here are a hundred organic and inorganic fluorine compounds which General presently offers. Many are produced in carload, tank car or other commercial quantities. Others are made in pilot plants or intermittently on a laboratory scale for experimental uses. For some of these, studies of properties are in early stages. General has a number of other fluorine products under investigation in addition to those on the list; thus the company is geared to serve you well—now—and in the future.

That's why it's wise to see General Chemical when your work indicates the need for fluorine chemicals. With fifty year's experience in the field, we may be able to save you time, money and effort.

For more information use the handy coupon.



GENERAL CHEMICAL DIVISION

ALLIED CHEMICAL & DYE CORPORATION

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☐ Have a representative call on me _____

☐ I am interested in using this product for _____

Name _____

Title _____

Company _____

Address _____

City _____ Zone _____ State _____

CW-7

NON-METALLIC FLUORIDES

Boron Fluoride Gas
Boron Fluoride Ether (Diethyl) Complex